INDOOR AIR QUALITY IN

OHC APARTMENT BUILDINGS

WINTER AND SUMMER ASSESSMENT

MINISTRY OF HOUSING

TECHNICAL SUPPORT SERVICES BRANCH

December, 1989

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Prepared for

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By

Scanada Consultants Limited

Oakville, Ontario

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For use within the confines of the Government of Ontario and its agencies.

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EXECUTIVE SUMMARY

Scanada Consultants Limited was contracted by the Ontario Ministry of Housing to carry out an indoor air quality survey on a sample of fifteen apartment buildings located throughout Ontario, which are owned and operated by the Ontario Housing Corporation (OHC). The objectives were to determine the occupant perceptions of indoor air quality (IAQ), to assess the apparent incidence of actual problems, and to attempt to identify pollutants and sources.

The results of this survey clearly indicate that there is a perceived IAQ problem by the occupants of the OHC buildings surveyed. The perceived problems relate primarily to levels of temperature and relative humidity in the suites in winter, and to food and garbage odours (odours being most pronounced in the summer). Elevated levels of common pollutants (CO, CO_2, NO_2, HCHO, NH_3) were not detected. The most prevalent problem reported was dry air in the winter. The primary cause of low humidity would appear to be the lack of a provision for humidification in any of the buildings. Other perceived problems included cooking and garbage room odours. These odours appear to be distributing themselves primarily via the corridors which may be insufficiently pressurized to contain these odours at their sources. There also appears to be the problem of kitchen and bathroom exhaust vents backdrafting in a selected number of suites which would also aid in the transport of these odours.

Although there is a significant reporting of IAQ problems throughout the survey none of the problems recorded, data collected, or pollutants tested would indicate that there is any direct health risk to the occupants of these buildings. However, the reported problems do exist and constitute a definite dissatisfaction on the part of some occupants towards the quality of the air in their buildings.

It is recommended that: energy conservation measures be implemented in a manner so as not to reduce IAQ; further study be carried out to determine methods of odour control in OHC apartment buildings; humidity control in OHC apartment buildings be investigated, and; a more comprehensive approach be conducted to identify specific causes, effects, and possible corrective measures or methods of greater control of these IAQ problems (low humidity, and odours) in OHC apartment buildings.

1.0 INTRODUCTION

Scanada Consultants Limited was contracted by the Ontario Ministry of Housing to carry out an indoor air quality survey on a sample of fifteen apartment buildings located throughout Ontario, which are owned and operated by the Ontario Housing Corporation (OHC). The objectives were to determine the occupant perceptions of indoor air quality, to assess the apparent incidence of actual problems, and to attempt to identify pollutants and sources.

OHC presently owns and manages 65,000 apartment dwelling units; 20,000 of these units are contained in 590 low-rise (walk-ups of between 1 and 3 storeys) and 45,000 are contained in 270 high-rise (elevator serviced) buildings. These apartments date back to the 1960s and early 1970s and all building mechanical systems were designed and built to the then current code requirements.

As a result of energy conservation measures which have been implemented in some, if not all, of the 860 OHC apartment buildings, concerns have been raised regarding indoor air quality. To establish whether these concerns are justified, a sample of fifteen buildings located across Ontario was surveyed during the winter months (February and March) of 1989, with the findings reported in our earlier report dated March, 1989. To determine whether or not summer conditions influence air quality, a second study was undertaken during the summer months (August and September 1989). The surveys comprised of occupant interviews to establish perceived IAQ problems, and pollutant tests to attempt to substantiate any reported problems. Pollutant tests were conducted for: Carbon Monoxide (CO), Carbon Dioxide (CO_2), Nitrogen Dioxide (NO_2), Formaldehyde (HCHO), Ammonia (NH_3), and on a limited basis Ozone (O_3).

This report presents the results of both the summer and winter survey results. All pertinent data presented in the Part I report has been reproduced here and compared with the results of the summer survey. Based on the findings and presentation of both Part I and Part II data, conclusions have been drawn and recommendations made.

2.0 OBJECTIVES

The purposes and objectives of the air quality survey were as follows:

1. To determine the perceptions of the occupants and their opinions concerning air quality in their building.

2. Based on the findings of the occupant interviews, perform air quality tests in the apartment buildings to compare results of a range of common pollutants (the pollutants tested for were: CO, CO_2, NO_2, HCHO, NH_3, and in a limited number of cases O_3).

3. To provide the Ontario Ministry of Housing with a report presenting summer and winter findings concerning:

   (a) incidence of perceived air quality problems, and

   (b) incidence of actual air quality problems and correlation with perceived problems,

4. To identify sources/causes of problems and possible corrective measures if deemed necessary.

3.0 SURVEY SUMMARY

Fifteen apartment buildings were surveyed in the winter of 1989 (between February 10 and March 10) and then again in the summer (between August 16 and September 1). The buildings comprised of low-rise, high-rise, town-house style, and fourplexs. Occupancy in the buildings was either senior only, family only (including single adults), or mixed. The buildings were distributed throughout Ontario in five metropolitan areas: Toronto (5), Ottawa (3), Thunder Bay (3), Sudbury (2), and Windsor (2). (See Table 1 for a summary of the buildings surveyed and Appendix C for a brief description of each building.)

TABLE 1: SUMMARY OF APARTMENT BUILDINGS SURVEYED

Location & Contact	OHC #	Address	# Storeys	# Suites	Type	# Interv.* W	# Interv.* S	# IAQ Tests W	# IAQ Tests S	Dates Surveyed (1989) W	Dates Surveyed (1989) S
TORONTO											
E. Donovan	OH-76	2821 Birchmount	12	239	Fam.	9	10	4	4	Feb 10	Aug 16
P. Rodulfo	OH-84	30 Falstaff	19	224	Fam.	10	10	4	4	Feb 22	Aug 29
R. Hanna	OH-88	285 Shuter	15	301	Fam.	14	14	5	5	Feb 27	Aug 28
C. Pinto	OH-98	5 Bellevue	21	326	Fam.	14	14	6	6	Feb 28	Aug 17
K. Outram	OH-168	85 Spencer	7	57	Sen.	6	6	3	3	Feb 21	Aug 16
OTTAWA											
T. Mason	OH-9	1180 Shillington	3	30	Mix.	6	6	4	4	Mar 8	Aug 22
	OH-18	1065 Ramsay	14	208	Fam.	10	10	4	6	Mar 10	Aug 21
	OH-50	160 Charlotte	14	216	Sen.	10	10	4	4	Mar 9	Aug 22
WINDSOR											
E. Keczen	OH-1	445 Glengarry	6	132	Fam.	10	10	7	5	Feb 24	Aug 24
	OH-3	333 Glengarry	8	135	Sen.	10	10	4	4	Feb 23	Aug 24
SUDBURY											
J. McIssac	OH-15	401 Rumball	12	162	Fam.	10	10	6	6	Feb 13	Aug 30
	OH-16	201 Rumball	11	101	Sen.	8	8	5	5	Feb 14	Aug 30
THUNDER BAY											
B. Abbott	OH-1	500-592 James	2	24	Fam.	6	6	4	4	Feb 16	Aug 31
	OH-3	75 Academy	3	29	Fam.	6	6	4	4	Feb 15	Aug 31
	OH-4	544 N. Court	7	60	Sen.	6	5	3	3	Feb 15	Sep 1
				2219		135	135	67	67		

* '# Interv.' represents the number of suites whose occupants were interviewed at the time of the building surveys. 'W' - Winter, 'S' - Summer

In each building, occupants from between 5% and 10% of the apartment suites were interviewed. In Part I (winter survey) the suites were chosen at random; care was taken to avoid concentrating on any one floor of the building or any one particular location. In Part II (summer survey) every attempt was made to interview the occupants of the same suites as those interviewed in Part I. Due to moves, people not home, etc., it was impossible to re-interview everyone; fifty-eight percent (58%) of those previously interviewed were again interviewed in Part II.

If a number of occupants made claims of poor indoor air quality, the air was tested to measure the concentrations of the five different pollutants. Air quality tests in Part II were repeated in the same locations as those taken during Part I. See Appendix A (**Survey Protocol**), and Appendix B (**Survey Forms**) for details on the procedures followed during the apartment surveys.

In Part I, the survey of the apartment building as a whole concentrated on two areas: identifying potential indoor air quality problem areas such as garbage rooms, garages and laundry rooms; and determining the type and operation of all mechanical systems relating to heating and ventilation. Any changes to the collected data from Part I was recorded during Part II.

Apartment suite surveys identified: typical occupancy of the suite, suite layout and size, mechanical ventilation (amount and apparent effectiveness), amount of moisture produced by occupants, amount of conditioning done to the air above what is supplied by the building, general living habits, and the occupant's perception of indoor air quality in his/her apartment and in other parts of the building.

Sets of IAQ tests were performed at each apartment building to try to identify the presence of air pollutants regardless of any occupant complaints and also to attempt to substantiate any occupant's claims of IAQ problems. The samples were taken using a GasTec detection pump and detector tube system so that results could be obtained quickly and conveniently. In our discussions, an IAQ test always refers to a series of samples of the five different gases, thus providing a concentration profile for each gas throughout the building.

Ozone was also tested for on a trial basis to see if any measurable quantities could be detected. Only a limited number of these tests were performed (8). Ozone tests were taken only on days and in buildings in which elevated ozone readings were considered to be of a high probability.

4.0 SURVEY RESULTS

The apartment building surveys were divided into three parts: the General Building Survey, the Apartment Suite Surveys, and the Indoor Air Quality Tests. Following is a presentation of the collected data along with the methods used in each part of the survey procedure.

For a complete review of the data collected see Appendix F for tables of: **General Building Survey Raw Data**, **Apartment Suite Survey Raw Data**, and **IAQ Test Raw Data**.

4.1 General Building Survey

The information contained in the **General Building Survey Form** was obtained via measurements, observations and through communications with the local Housing Authority and on-site building staff during Part I (winter) of this project. During Part II (summer) this data was reconfirmed and any changes noted (see Appendix B for a blank copy of this form).

Data collected included:

- Weather conditions (cloud cover, precipitation, temperature, relative humidity, wind speed, and wind direction)
- General building details (location, age, number of storeys, number of apartment suites)
- Building Construction (wall and slab construction, window types, door types)
- HVAC details (heating systems, controls, make-up air, exhaust systems)
- Garbage collection details
- Laundry room information
- Parking arrangements
- Local environmental effects on air quality

Table 2 is a synopsis of the General Building Survey Form Data and shows the level of diversity between the buildings surveyed.

TABLE 2: GENERAL BUILDING SURVEY DATA SYNOPSIS

CATEGORY	AVG.	MIN.	MAX.
Age	18	14	25
Storeys	10	2	21
Apts/Floor	14	2	22
Tot No. of Suites	150	24	326

Other data collected included:

- Two basic types of heating systems prevailed in the buildings surveyed: hot water, and baseboard electric. Variations on these included: zoning of the hot water piping and boilers to two halves of the building, and radiant electric panels mounted in the ceilings of all suites.
- Make-up air systems, if present, were usually heated and operating at least through the daytime hours. Other scenarios included unheated make-up air and make-up air units that operated based on a preset schedule.
- Most apartment buildings had controllable thermostats in all suites (73%, 11 of 15), 20% (3 of 15) had no control over the heating in their suites, while in one building the practice of disconnecting the thermostats in suites and leaving them in the ON position was being done.
- No buildings were centrally air conditioned. In general, air conditioning was found in offices located in the basements or first floors and in a limited number of suites where the tenant has installed a window mounted air conditioner.
- All buildings had bathroom exhausts, 8 were central (roof-top) and operating continuously, 2 were central (roof-top) and operating on timers, and 5 were local fans in the individual suites operated manually by the occupant. Kitchen exhaust types varied from: 6 buildings having none (these building's kitchens usually had operable windows), 7 were local and manually operated, and 2 were central (roof-top) and continuously operating.

- Windows in all apartment buildings were operable to some extent and used extensively for ventilation in the summer.
- The majority of garbage collection rooms were on the ground floors inside the buildings.
- The majority of laundry rooms were on the ground floors (7 of 15); basement and every floor were the next most popular locations (3 of 15 for each).
- 7 of the 15 buildings had underground parking. It was noted however that almost all of these garages were not being used due to structural problems.
- All the buildings were, in some respect, exposed to an outdoor source of pollution. This ranged from highways some 5 km away to major express routes, and heavy industrial sites less than 1 km away.

See Appendix B for a detailed list of the general building information data that was collected, and Appendix F for the compiled raw data.

4.2 Apartment Suite Survey

The information contained in the **Apartment Suite Survey Form** (see Appendix B for a blank copy of this form) was obtained via measurements, observations and through interviews with the apartment suite occupant(s). The data collected was extensive and due to the sheer volume only the pertinent information is presented, summarized and analyzed. During the winter, occupants from 135 suites in 15 apartment buildings were interviewed. In Part II (summer) as many as possible of these initially interviewed occupants were re-interviewed for comparison purposes and to fully assess the air quality throughout a full year. 58% of the original tenants were re-interviewed in the summer, the remaining 42% (for a total of 135 suites) were selected randomly.

Data collected includes:

- Occupancy (number of occupants, sexes, ages)
- Number and level of smoking
- Respiratory medical complaints that could be affected by IAQ

- Apartment suite information (size, number bedrooms, type and location of exhaust fans)
- Humidity generating habits of the occupants (number meals/week, number showers/week, humidification, clothes washing and drying in the suite)
- Possible pollutant sources in the suite itself (cleaning fluids, air fresheners)
- The use of extra heat and air conditioning
- Habits regarding ventilating the suite (opening windows)
- Reported IAQ problems in the occupant's suite and in the building; whether they find these problems bothersome, when and where they occur, and what they do to relieve any discomfort related to the problem.

Table 3 is a synopsis of a portion of the Apartment Suite Survey Form Data.

TABLE 3: APARTMENT SUITE SURVEY DATA SYNOPSIS

	WINTER				SUMMER			
CATEGORY	AVG.	MIN.	MAX.	TOTAL	AVG.	MIN.	MAX.	TOTAL
Temperature (°C)	23.2	17	28	n/a	24.6	16	30	n/a
RH (%)	23.5	9	49	n/a	41.7	30	58	n/a
No. Occupants *	1.9	1	6	251	1.9	1	5	248
No. Females	1.1	0	3	149	1.1	0	3	153
No. Males	.7	0	4	97	.6	0	2	90
No. Seniors (>54)	.5	0	2	67	.4	0	2	57
No. Adults (18 to 54)	.8	0	3	102	.7	0	3	107
No. Children (<18)	.6	0	5	61	.6	0	4	82
No. Smokers	.6	0	3	84	.5	0	2	76
Meals/week	14.6	0	24	n/a	12.7	0	28	n/a
Baths or Showers/week	10.3	0	45	n/a	11.2	0	42	n/a
Humidified suites				36				26
Air Conditioned suites				38				31
Suites with Extra Heating				16				12
Reported Suite IAQ Problems				67				57
Reported Bldg IAQ Problems				53				65
Suites interviewed				135				135
Suites re-interviewed				n/a				78

* The sex and age of some occupants of the suites surveyed was not recorded.

Note: Averages, Minimums and Maximums are per apartment suite. The Total represents the number in that category out of 135 interviewed suites.

The following Figures provide more details with respect to the suite data collected. Percentages are based on the number of responses in a category out of the 135 suites interviewed. See Appendix E for supplementary graphs not included in the body of this report.

A summary of the level of perceived suite and building IAQ and how this perception has changed between the winter and summer surveys is presented in Figures 1 and 2. Notice that perceived suite IAQ has improved slightly in the summer while, building IAQ has worsened slightly.

Figures 3 and 4 show the percentage of reported IAQ problems in the suites and building, and compare the winter and summer values. Notice that dry air and food odours are the two most prevalent reported suite problems. The respective summer values for food odours and dry air are markedly lower (although still the two highest percentages) while humidity has had a marked increase. Food odours and garbage odours prevail in reported building IAQ problems with garbage odours being of a larger concern in the summer and food odours less of a concern. The group "Other" is a collection of responses, each of which was reported once or twice and hence have all been lumped under this heading.

Figures 5 and 6 show the relative perception of dry and moist air problems between the winter and summer surveys. Note the decreased occupant perception of dry air (Figure 5) and increased perception of moist air (Figure 6) in the summer.

The measured relative humidity distribution is shown in Figure 7. The winter portion of this graph shows four-fifths of the suites surveyed with below 30% RH and about one-third of the suites with lower than 20% RH. Only one-fifth of the suites had an acceptable winter relative humidity level of between 30% and 55% (as set forth by Health and Welfare Canada guidelines, see Appendix D). However, the summer portion revealed that almost nine-tenths of the suites surveyed had a relative humidity level of between 30% and 50%. Summer relative humidity levels were directly in line with Health and Welfare Canada guidelines.

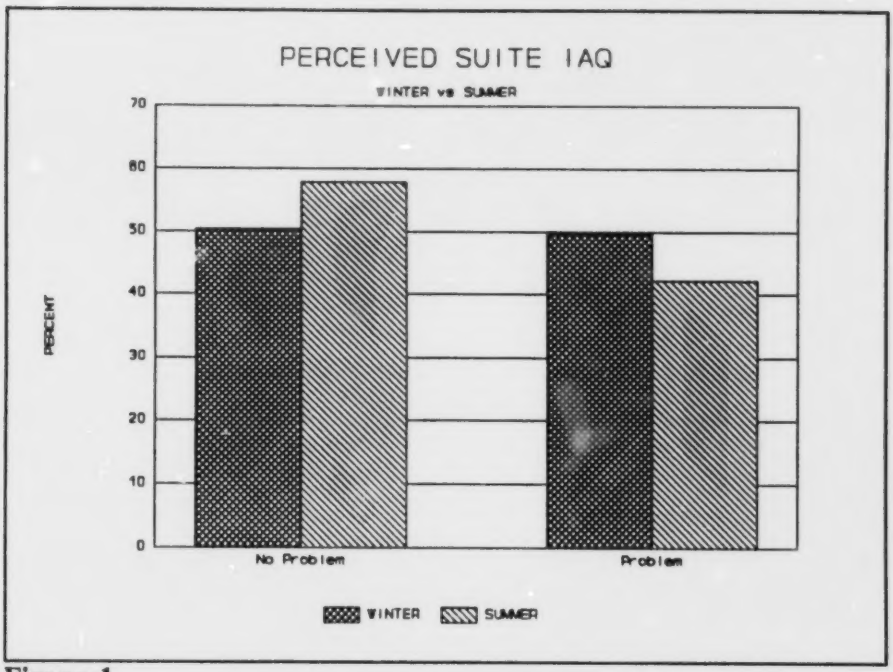


Figure 1

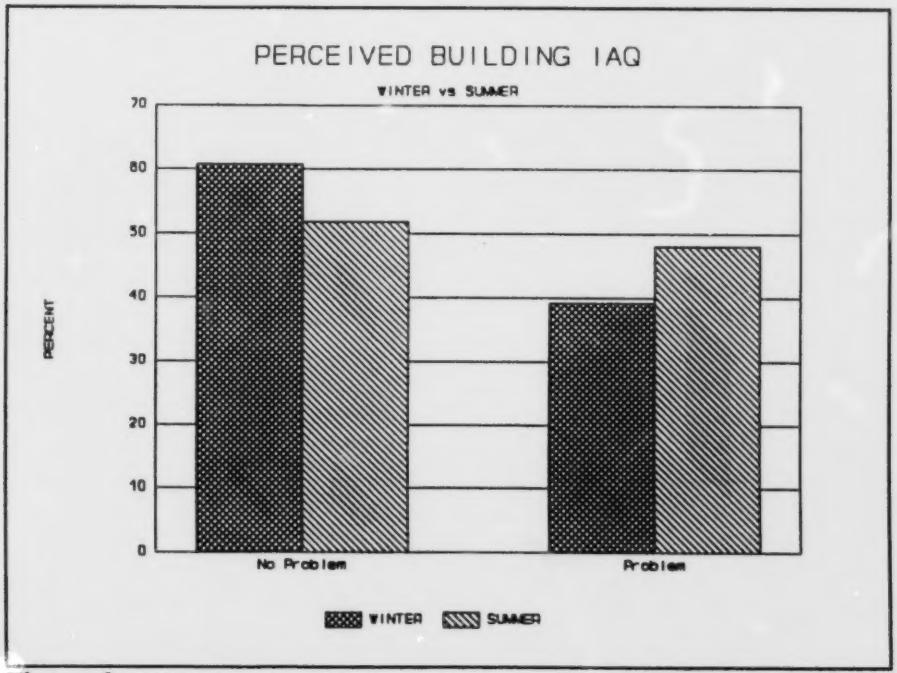


Figure 2

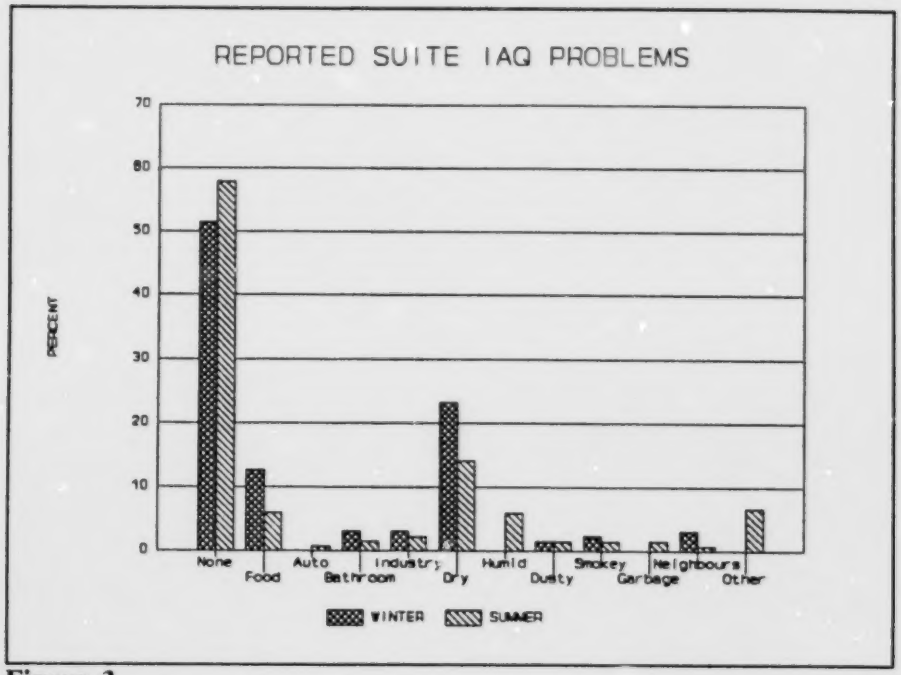


Figure 3

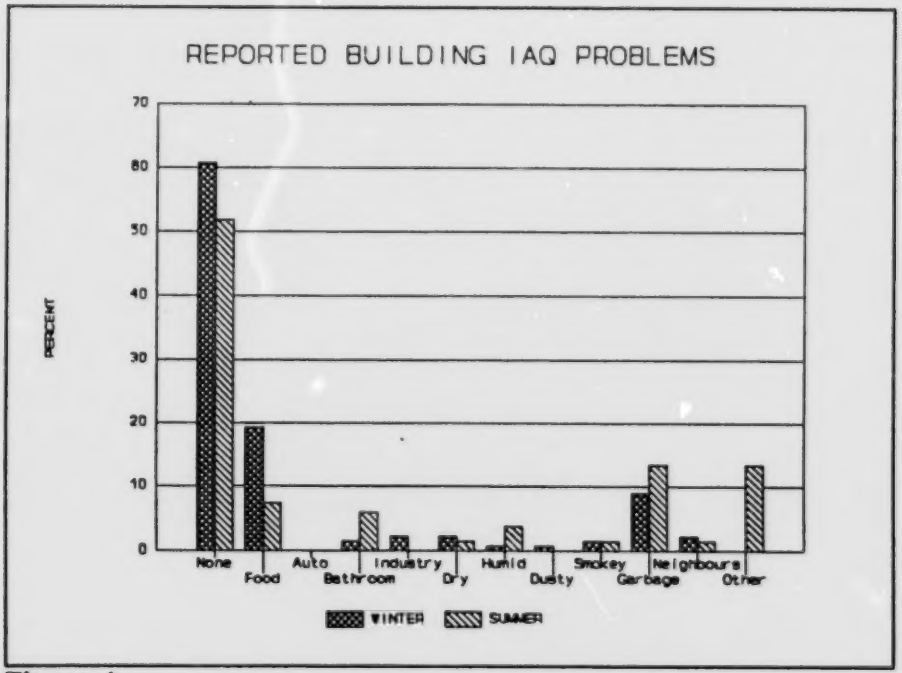


Figure 4

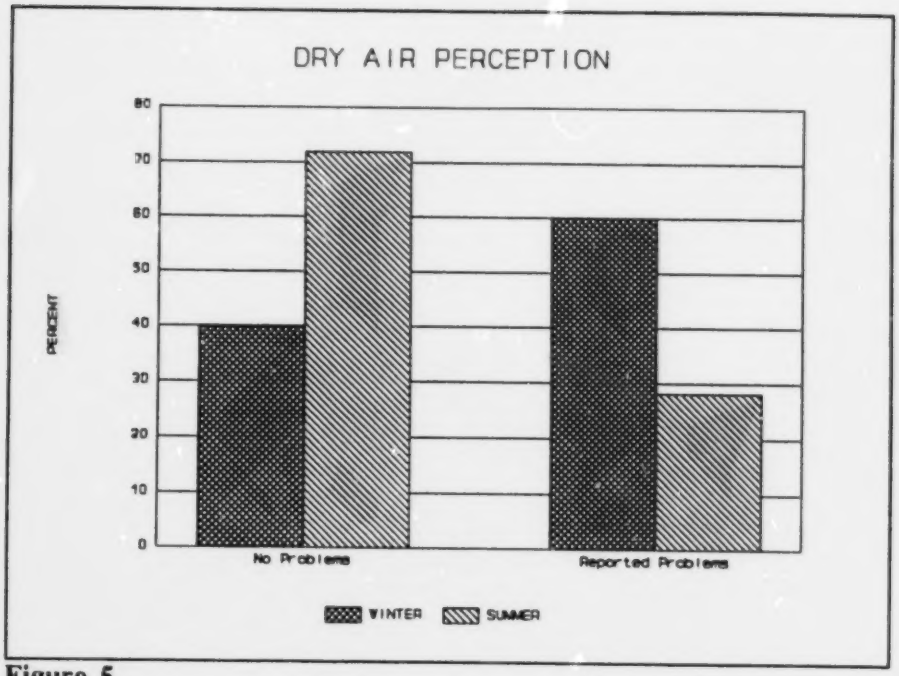


Figure 5

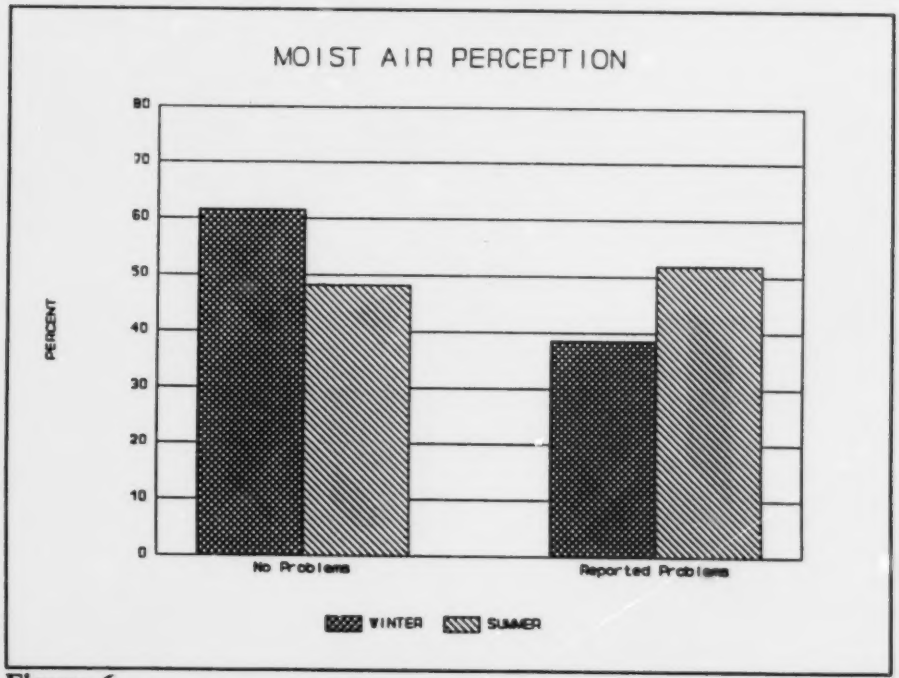


Figure 6

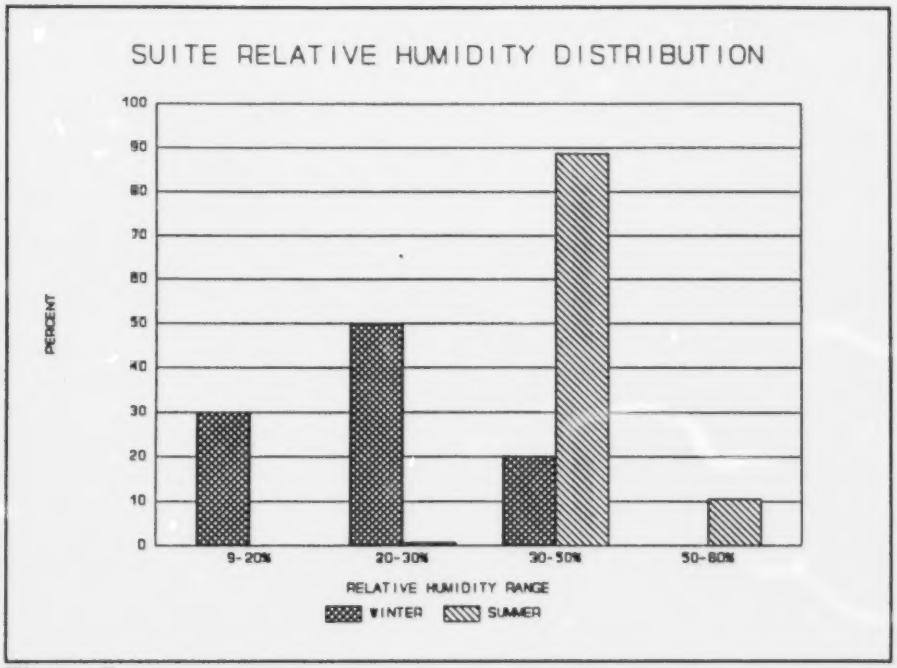

SUITE RELATIVE HUMIDITY DISTRIBUTION
PERCENT
100
90
80
70
60
50
40
30
20
10
0
9-20%
20-30%
30-50%
50-80%
RELATIVE HUMIDITY RANGE
WINTER
SUMMER

Figure 7

4.3 IAQ Tests

This part of the survey consisted in obtaining the information specified in the **Record of IAQ Tests Form** (see Appendix B for a blank copy of this form). The pollutant concentrations were obtained via measurements using a GasTec Pump and detector tubes for the gases in question: (CO, CO_2, HCHO, NO_2, NH_3, and in limited cases O_3). An electronic thermometer/hygrometer or a sling psychrometer was used for the measurement of temperature and relative humidity.

Data collected included:

- Location of tests (floor and suite number if applicable)
- Temperature, relative humidity, and perceived air movement
- measurements of the gases mentioned above

See Appendix A for the protocol on the method used in determining the locations and number of tests to be performed.

CO and CO_2 were the only pollutants to register any significant levels. HCHO, NO_2 and NH_3 all registered zero in almost every test (those tests that were not zero were of such a low concentration that their presence poses no concern).

O_3 tests were conducted during the summer survey (Part II) in a limited number of cases on a trial basis. The intent was to perform O_3 tests on days and in buildings where the probability of elevated levels would be high. Table 4 shows that in all cases the measured O_3 levels were below the exposure limits set out in Table D.1 in Appendix D. Also note that the indoor levels were consistently lower than the outdoor levels.

Figures 8, 9, 10 and 11 show the CO_2 and CO concentration distributions of the buildings as surveyed in the winter and summer. The buildings are identified on the figures by their city location and their OHC number (eg. Ottawa, 1065 Ramsay, OH-18, would be O18; Toronto, 85 Spencer, OH-168, would be T168; etc.).

All indoor levels of CO_2 (both winter and summer) were below the recommended long term exposure limit for residential indoor air of 3500 ppm. However, a small number of tests exceeded the target limit of 800 ppm. Most of the tests that exceeded the target were related to either high suite occupancy or a moderate to high degree of smoking.

Two measurements of CO shown in Figure 10 (winter) are of unusually high concentration. These measurements were taken in the underground parking garage that is shared by two buildings (Sudbury OH-15 and OH-16) and was attributed to the malfunctioning of the exhaust fans (this problem was in the process of being rectified at the time of the winter survey). As can be seen in Figure 11 (Summer Indoor CO Levels), this problem still has not been corrected to a degree in which the CO levels are being controlled below the recommended eight hour residential exposure limit. However, because these tests were conducted in an underground parking garage the one hour exposure limits could be applied (< 25 ppm) and these levels would then be considered acceptable. Although elevated CO levels were not detected in the apartment building itself, caution should be exercised to ensure that ventilation systems, or lack thereof, are not driving CO into the living areas of the buildings.

All other measurements of CO were below the recommended long term exposure limit for residential indoor air of 11 ppm.

Consistently lower indoor levels of CO and CO_2 in summer can be attributed to a higher level of ventilation to the suites accomplished by tenants keeping windows open on a near continuous basis. Note, that although the summer indoor levels are generally lower than winter indoor levels the opposite is true for outdoor levels (see Figures 12 and 13).

Only a small number of IAQ tests identified any evidence of HCHO, NO_2, and NH_3; so few (and concentrations so low) that no data can be presented to substantiate any claims of IAQ problems. All registered values of NH_3 were attributed to elevated smoking levels or a high level of occupancy (i.e., metabolic activity).

Table 4 is a synopsis of the winter and summer IAQ Test Data collected. See Appendix F for a complete printout of the compiled data.

TABLE 4: IAQ TEST DATA SYNOPSIS

	WINTER			SUMMER		
CATEGORY	AVG.	MIN.	MAX.	AVG.	MIN.	MAX.
Temperatures (°C)	21.7	13.8	27.2	29.3	19	27
Relative Humidity (%)	21.5	11	51	41.5	31	55
INDOORS (ppm)						
CO-Carbon Monoxide	3.2	0	50	0.5	0	20
CO_2-Carbon Dioxide	654	300	1300	527	300	1000
HCHO-Formaldehyde	0	0	0	0	0	0
NO_2-Nitrogen Dioxide	0	0	0	0	0	0
NH_3-Ammonia	0.04	0	1	0.05	0	2.5
O_3-Ozone (4 tests only)				0.012	0	0.05
OUTDOORS (ppm)						
CO-Carbon Monoxide	0.13	0	1	0.27	0	4
CO_2-Carbon Dioxide	402	300	500	447	300	550
HCHO-Formaldehyde	0	0	0	0	0	0
NO_2-Nitrogen Dioxide	0.01	0	0.1	0	0	0
NH_3-Ammonia	0	0	0	0	0	0
O_3-Ozone (4 tests only)				0.037	0.25	0.05

Note: 51 indoor IAQ tests and 15 (one for each building) outdoor tests were performed.

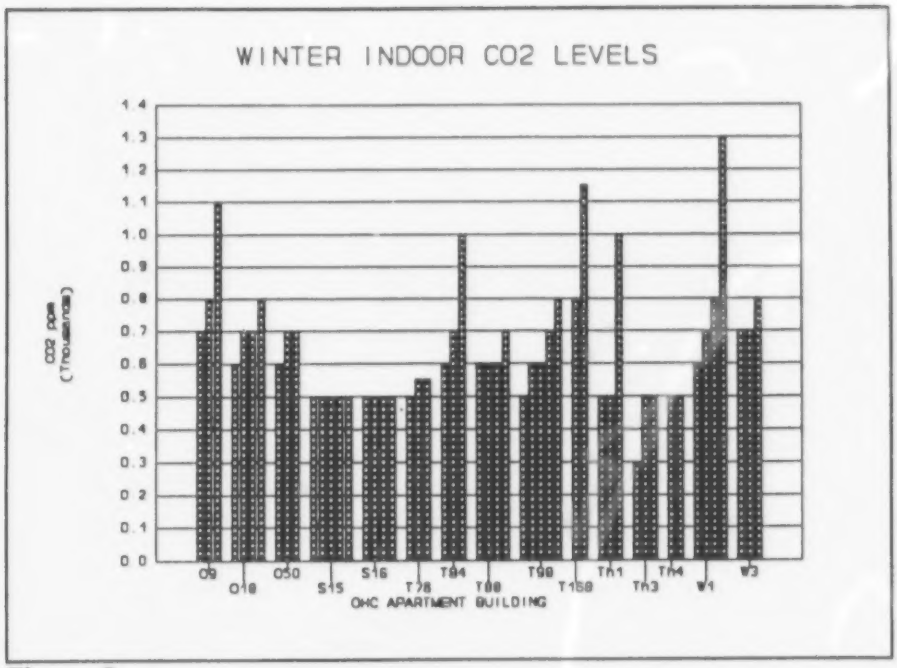


Figure 8

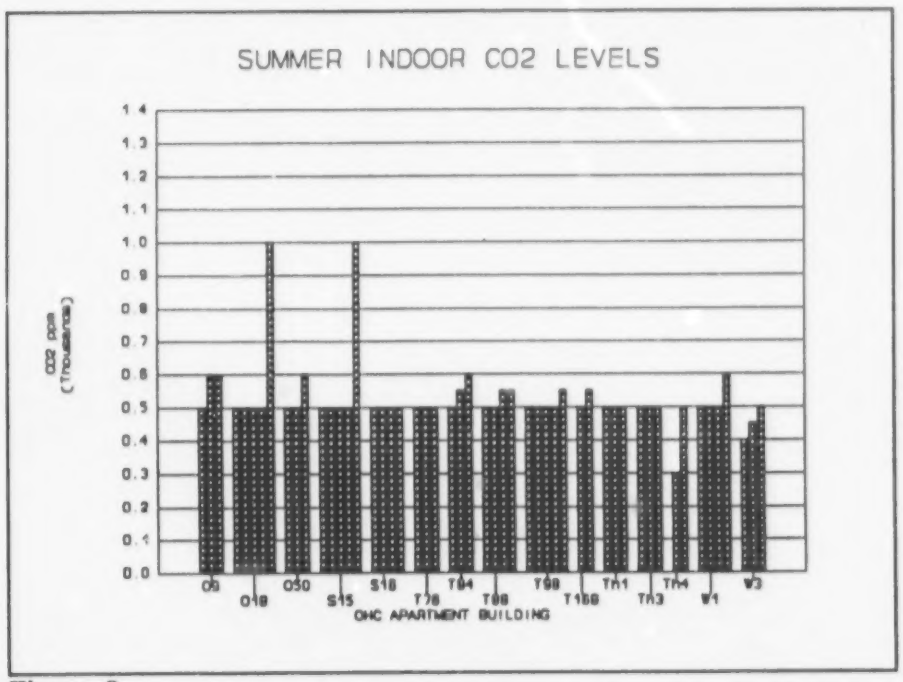


Figure 9

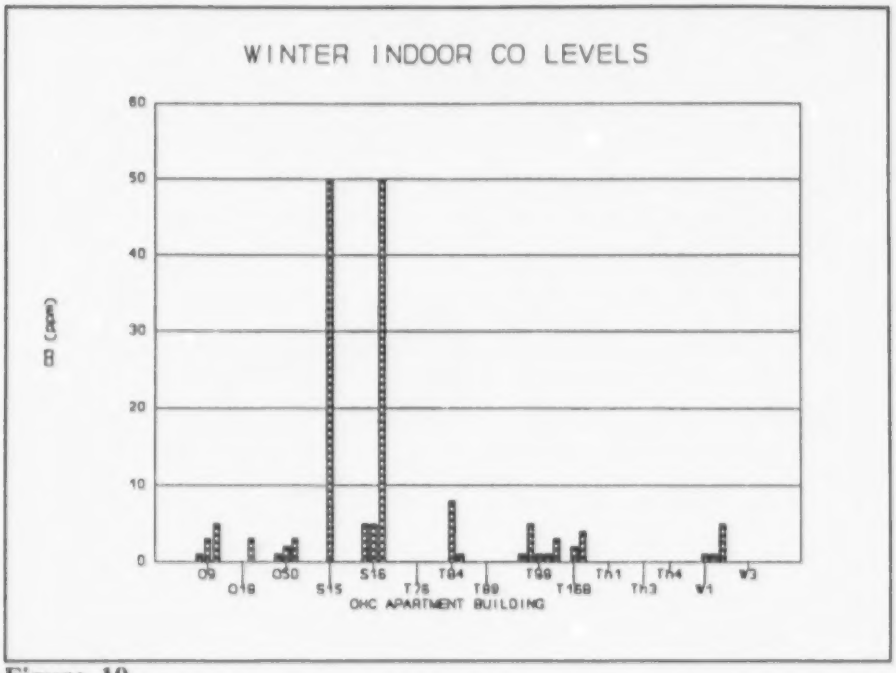


Figure 10

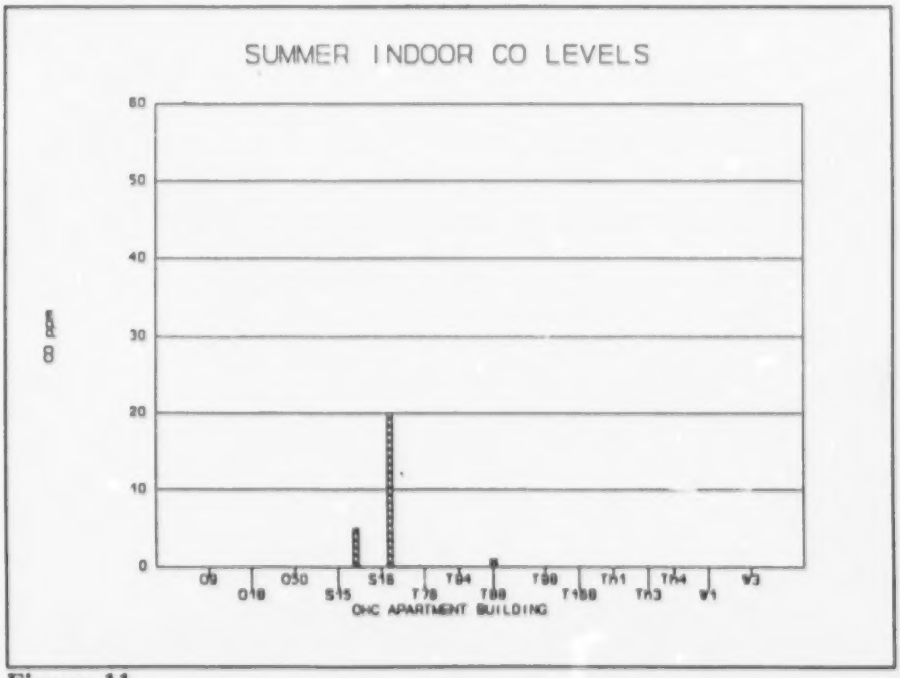


Figure 11

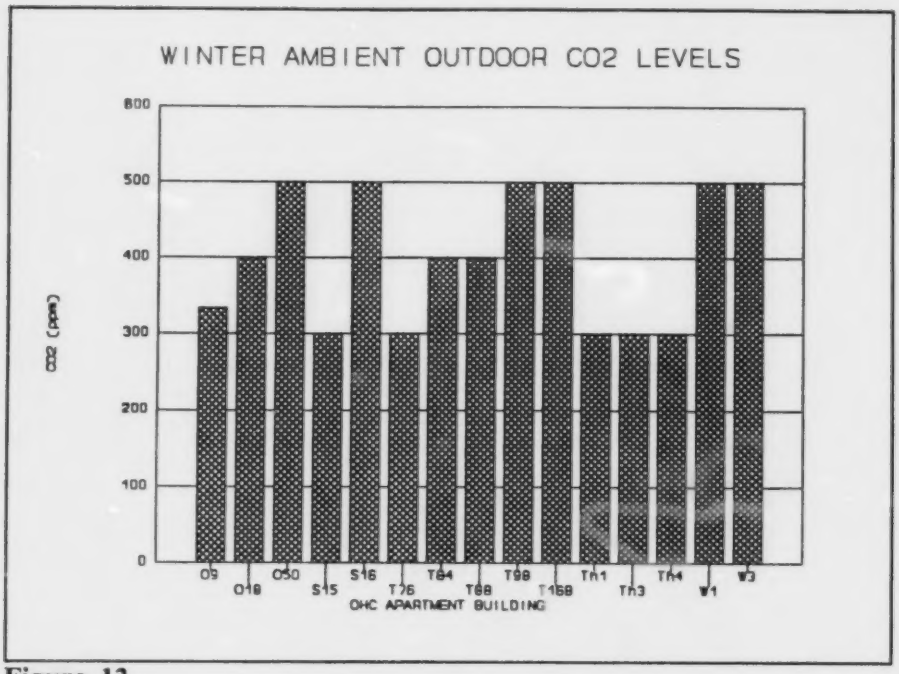


Figure 12

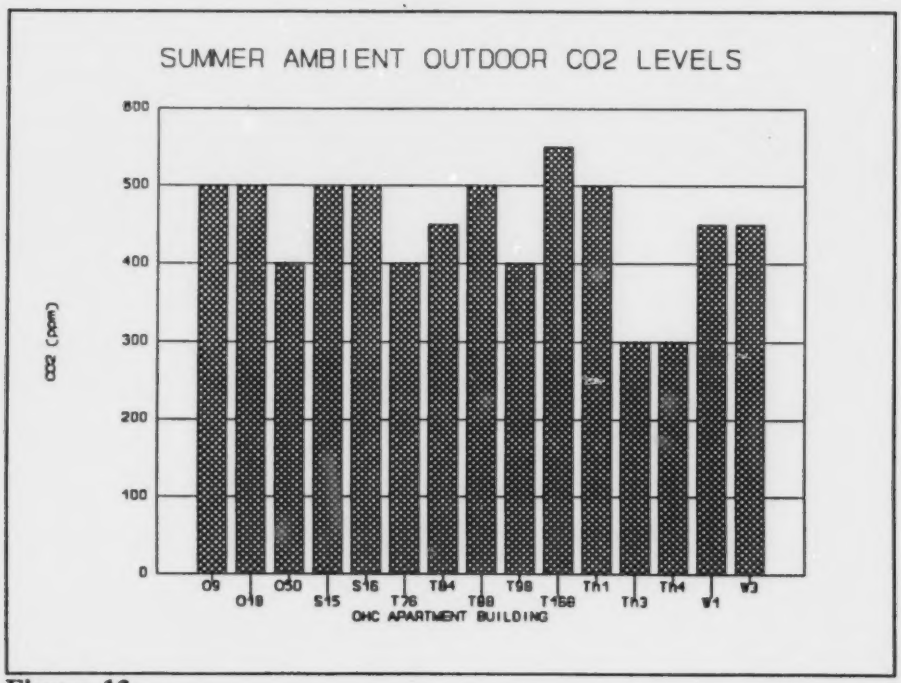


Figure 13

5.0 ANALYSIS AND DISCUSSION OF RESULTS

A substantial amount of data was collected during this project, mush more than was needed to attain the desired objectives. The analysis of the results has been restricted to reviewing only that data which directly relates to answering the objectives of the project.

Upon examination of the results reported in Table 3 (see items: Reported Suite and Building IAQ Problems), one finds a surprising 50% (67 of 135) of the winter respondents and 42% (57 of 135) of the summer respondents perceived some form of problem in their suites; and 39% (53 of 135) of the winter respondents and 48% (65 of 135) of the summer respondents perceived problems in the buildings' common areas (halls, stairwells, lobby, etc.). These values indicate clearly, from the sheer volume of positive responses, that some form of IAQ problem exists. The fact that the number of reported suite problems decreased in the summer can be attributed to higher levels of ventilation due to tenants opening their windows in the summer for cooling. These results are shown in Figures 1 and 2.

Figures 3 and 4, **Reported Suite/Building IAQ Problems**, show that 75% of the positive winter responses and a surprising 48% of the positive summer responses, with respect to suite IAQ problems, were from dry air or food odours, and 72% (winter) and 44% (summer) of the reported building IAQ problems were from food odours and garbage odours. Garbage odours appear to be predominant in the summer; likely due to increased rates of decay because of elevated ambient temperatures in comparison to winter.

Figures 5 and 6 show a definite shift between winter and summer perceived dry and moist air problems. This shift to fewer reported dry air problems and more reported moist air problems in the summer can be attributed to the increased outdoor ambient relative humidity levels and the fact that tenants tend to open their windows more in the summer for ventilation.

The survey results indicate a definite dry air problem in the winter. Figure 7 (Suite Relative Humidity Distribution) shows that in the winter four-fifths of the suites surveyed were below 30% RH while, about one-third were below 20% RH. These low humidity levels, coupled with

the fact that dryness was identified as the most predominant winter problem in the apartment suites, constitutes this as a significant IAQ problem. ASHRAE comfort standard (Figure D.1 in Appendix D) recommends exposure limits of 20% to 70% RH in the summer and 25% to 85% RH in the winter. Health and Welfare Canada (Appendix D) recommended short term exposure limits are 30% to 80% RH in the summer and 30% to 55% in the winter.

In the summer, although the percentage dropped off markedly, dry air was still reported as the largest single IAQ problem. This problem was reported in relation to dry air in the winter. The fact that during the summer survey dry air was still the number one complaint enforces the validity of this complaint. The second largest concern of IAQ reported in the summer was elevated humidity; again caused by the propagation of warm humid outdoor air in the summer.

It is interesting to note that none of the respondents reported symptoms such as headaches, fatigue or an increased perception of warmth which are commonly related to high concentrations of CO_2 (typically, levels over 800 ppm). However the symptom of unpleasant odours (which is also related to elevated levels of CO_2) was reported; in fact this particular symptom was quite common among the reported suite IAQ problems. Note, however, that the occupants explained these odours as being food, bathroom, or neighbour related. An examination of the winter correlation between the reported IAQ problems and the measured CO_2 concentrations in the suites shows a slight positive correlation (see Figure 14). Although a majority of suites with elevated (equal to or greater than 800 ppm) CO_2 levels complained of poor IAQ, caution must be exercised drawing conclusions due to the small sample size (there were only 8 out of 53 tests done in suites where the CO_2 concentration was equal to or greater than 800 ppm). The summer survey produced only one suite in which the measured CO_2 levels were above 800 ppm hence no summer correlation was observed.

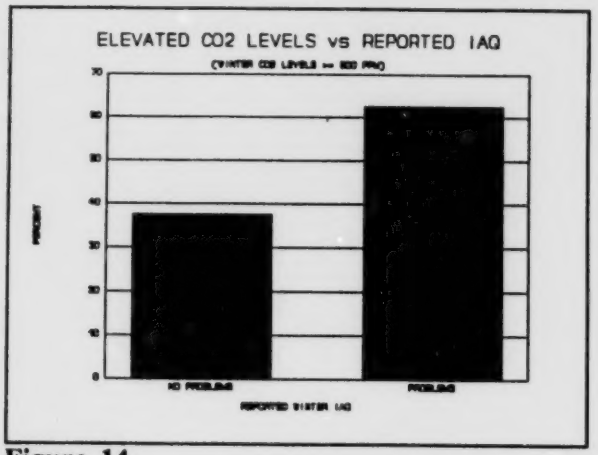


Figure 14

In an attempt to identify positive correlations between reported IAQ problems and other collected data the mechanical systems of the buildings were investigated. Figures 15 and 16 show the distribution of heating system types vs reported IAQ problems for winter and summer data. The figures indicate that electric baseboard heating is less problematic, in terms of reported IAQ, than hot water systems. There was no evidence of why this could be so; our only explanation is that the occupants with baseboard electric heating would have a greater degree of control over the heat in their suites and hence this would translate to a higher degree of satisfaction with regards to their IAQ. (Note that there was virtually no change in recorded responses between the winter and summer surveys.)

Various correlations to reported IAQ problems were made. The most notable of these is the correlation of suite IAQ problems to the type of kitchen exhaust (Figures 17 and 18). Examination of the graphs will show that there are considerably fewer reports of IAQ problems when the occupant of the suite has manual control over a local exhaust fan in the kitchen. Accompanying this result is the observation that there were twice as many reports of poor suite IAQ in the winter when no kitchen exhaust fan existed. The summer results support these findings; however, the differences are not as pronounced as the winter results. Figures 18 and 19, **Bathroom Exhaust vs Winter/Summer Reported Suite IAQ Problems**, report a similar situation. This situation is not very pronounced in the winter; however, in the summer it is as strong as that for the kitchen exhaust fans (we were unable to hypothesize any reasons for this). The figures also show that a greater number of IAQ problems, both winter and summer, were reported when the bathrooms were served by a central bathroom exhaust fan operating with a timer. This result must be considered cautiously due to the fact that only two of the buildings surveyed had central bathroom exhaust fans with timers.

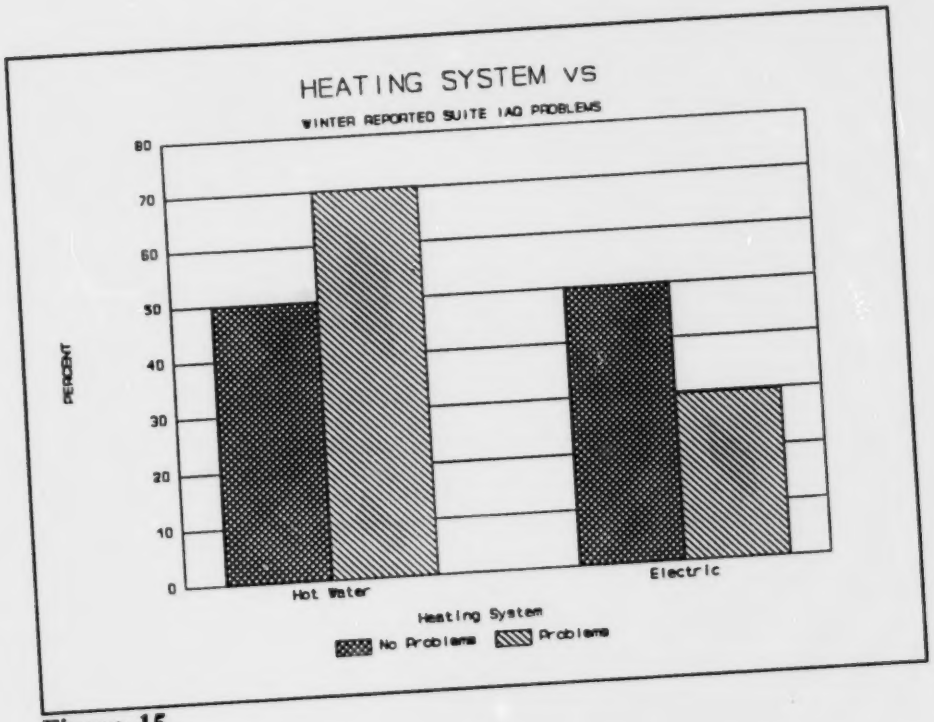


Figure 15

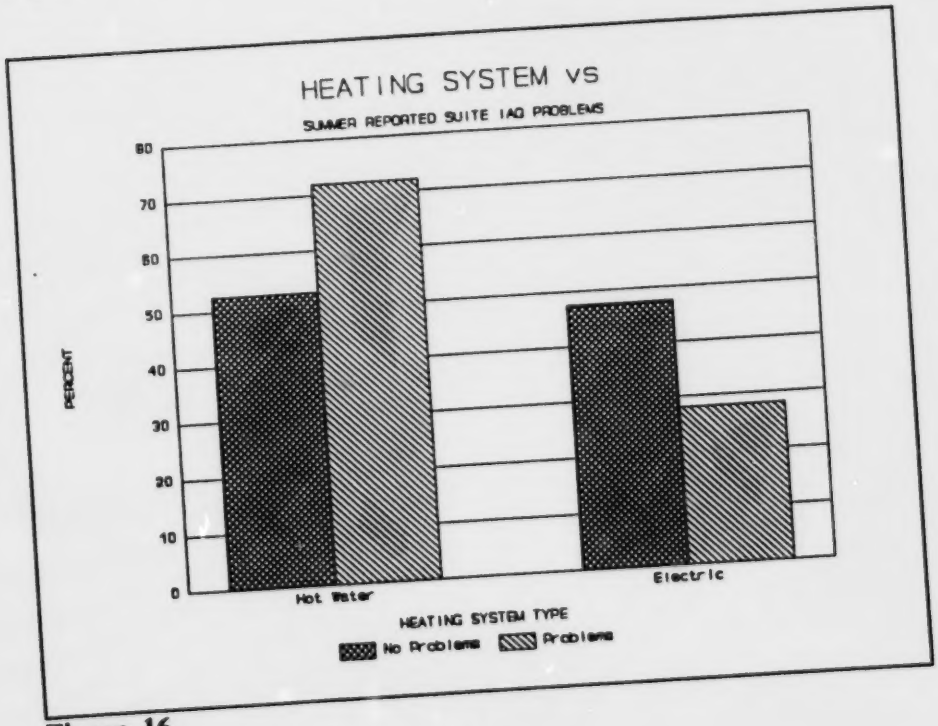


Figure 16

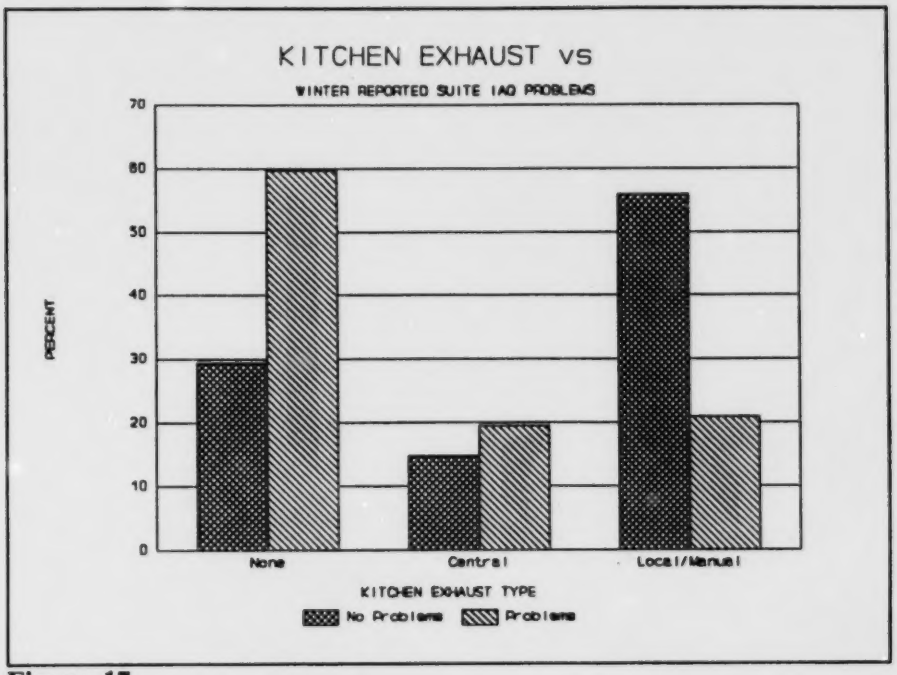


Figure 17

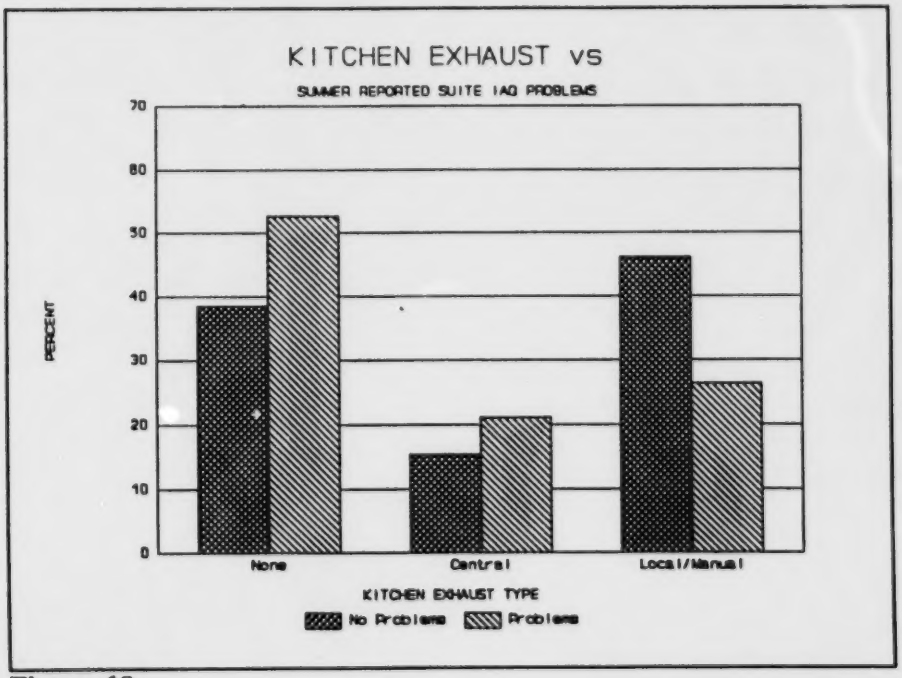


Figure 18

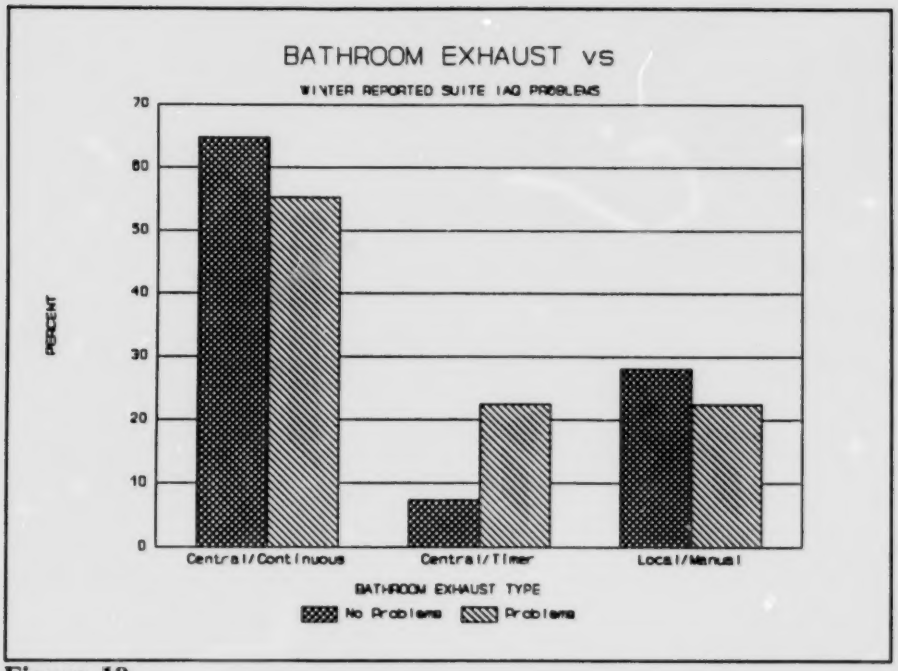


Figure 19

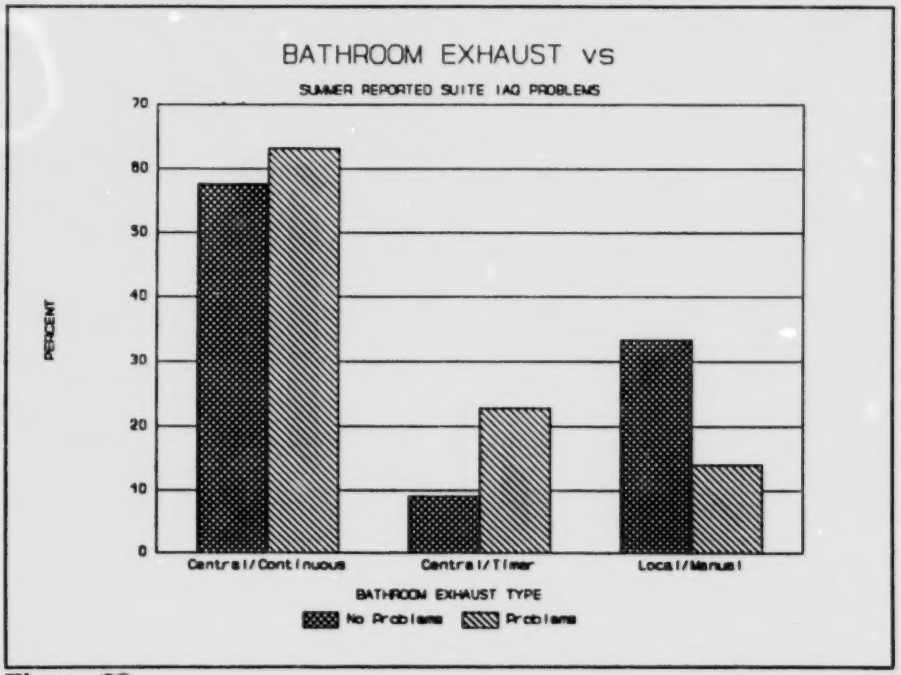


Figure 20

The correlation between manually operated exhaust fans and lower levels of reported IAQ problems may be due to one or more factors:

- Psychologically these tenants may have greater satisfaction with their IAQ when they have control over the exhaust systems directly.
- The central exhaust systems of these buildings may be in need of rebalancing or some other form of maintenance to be more effective.
- The timer controls of some central systems may be ill adjusted for the type of occupancy schedules of the buildings surveyed.
- Central exhaust fans may be under-sized for the job, in comparison to Local/manual systems, hence providing less than adequate ventilation when in operation.

None of the points above have been investigated during this project, hence no conclusions can be formulated at this time as to which of the four factors are predominant.

Many other areas were investigated in an attempt to identify positive correlations to poor IAQ but are not presented here due to the fact that no positive correlations were found. Though little or no correlation was found, they are still areas to be considered should further study be done. These areas include: metropolitan location of building, suite orientation, mechanical system controls, wall construction, garbage disposal, laundry facilities, parking arrangements, occupant breathing disorders, and many others. (See Appendix E for graphs detailing some of the above mentioned items.)

OHC has implemented a policy of energy conservation in their buildings. This general regard for reducing energy costs may have directly affected the IAQ in OHC apartment buildings. Common energy conservation measures include putting timers on kitchen and bathroom exhaust fans and on corridor make-up air units, as well as disconnecting the heating supply to the corridor make-up air or controlling it via outside air temperature. If careful consideration is not made as to the operation of these units, poor air quality could result. Although no correlation was found between the type of make-up air units and reported IAQ problems these systems are paramount in supplying fresh air and controlling IAQ in apartment buildings. It was beyond the scope of

this project to determine the direct impact that specific energy conservation measures may have had on indoor air quality in OHC apartment buildings.

6.0 CONCLUSIONS

It has been assumed that the apartment buildings selected by O.H.C and its regional offices for this study are representative of the building stock administered by the social housing sector of the Ontario Housing Corporation. The results obtained from both the winter and summer surveys of these fifteen buildings, although a small sample in relation to the total number of buildings under OHC's direction, will be generalized to the entire OHC building stock.

The results of this survey clearly indicate that there is a perceived IAQ problem by the occupants of the OHC buildings surveyed. The perceived problems relate primarily to suite levels of temperature and relative humidity in the suites in winter, and to food and garbage odours (odours being most pronounced in the summer). Elevated levels of common pollutants (CO, CO_2, NO_2, HCHO, NH_3) were not detected. The most prevalent problem reported was dry air in the winter. The primary cause of low humidity would appear to be the lack of a provision for humidification in any of the buildings. Other perceived problems included cooking and garbage room odours. These odours appear to be distributing themselves primarily via the corridors which may be insufficiently pressurized to contain these odours at their sources. There also appears to be the problem of kitchen and bathroom exhaust vents backdrafting in a selected number of suites which would also aid in the transport of these odours.

In general, for the pollutants tested (CO, CO_2, NO_2, HCHO, and NH_3), there were no elevated levels above the long term exposure limit guidelines set forth by Health and Welfare Canada that should be of concern. Those levels that were elevated were easily explained. Elevated levels of CO_2 above the target limit of 800 ppm were due to elevated smoking and occupancy levels. With continued levels above this range, the occupants can be expected to experience some sort of discomfort. As long as CO_2 levels remain below 3500 ppm there is no apparent concern of adverse health effects to the occupants. In general, summer CO_2 levels were lower than winter levels due to increased ventilation induced by open windows.

There appears to be a mild correlation between the occupant reported IAQ problems in the winter and the measured pollutant concentrations during the same time. Although the sample size is

small, this correlation is significant and supports, to some degree, the occupant responses of poor IAQ. No such correlation existed for the summer primarily due to the increased levels of natural ventilation.

Occupants of suites with local manual kitchen exhaust fans appear to be more satisfied with the quality of the indoor air than those with central fans or none at all. The same holds true for bathroom exhaust fans.

Through interviews with staff from the local housing authorities and building custodians, it was concluded that the implementation of energy conservation measures on the mechanical air handling systems of OHC buildings may have resulted in a degradation of the air quality due to the possible reduction in the amounts of fresh make-up air and exhaust air.

In summary, although there is a significant reporting of IAQ problems throughout the survey, none of the problems recorded, data collected, or pollutants tested would indicate that there is any direct health risk to the occupants of these buildings[1]. However, many of the reported problems do exist and constitute a definite dissatisfaction on the part of some occupants towards the quality of the air in their buildings.

---

[1] With the exception of the CO (50 ppm+) winter measurement found in the parking garage of Sudbury OH-16 & OH-15 (this problem was in the process of being corrected at the time of the survey). The measured summer value of 20 ppm is within the short term exposure limits.

7.0 RECOMMENDATIONS

Pursuant to the consideration and analysis of the information and data collected in this study, Scanada makes the following recommendations:

1) Energy conservation measures should be implemented in a manner so as not to reduce indoor air quality. Careful examination of energy conservation measures should be undertaken to determine their possible effect on the resultant indoor air quality of the buildings in question.

2) Further study should be carried out to determine methods of odour control in OHC apartment buildings. The most effective method of determining this may be in conjunction with a complete HVAC audit of identified problem buildings.

3) Humidity control in OHC apartment buildings should be investigated. The low levels of relative humidity measured in winter are poorly tolerated by many people and were found to be the number one complaint among the occupants surveyed. The addition of some form of humidification control could potentially reduce the number and frequency of complaints of poor IAQ among the residents of OHC buildings.

4) If it is the policy of the Ministry of Housing to try to minimize the complaints from tenants in apartment structures, we would recommend a more comprehensive approach to identify specific causes, effects, and possible corrective measures or methods of greater control of these IAQ problems (low humidity and odours) in OHC apartment buildings.

APPENDIX A: Survey Protocol

- Survey Procedure
- Selecting Suites for Occupant Interviews
- IAQ Gas Tests
- Selecting Locations for IAQ Tests

A. SURVEY PROTOCOL

The sub-sections below outline the procedures followed before and during the apartment building surveys. These procedures were strictly adhered to in order to maintain the reliability and integrity of the collected data.

SURVEY PROCEDURE

1. Pre-arranged (through telephone contact), with responsible person at local OHC office, date and location of inspection visit.

2. When possible, obtained details of building from OHC representative prior to travelling to the city where buildings were located. (When available, studied the drawings for familiarity of the building, and completed as much detail on the questionnaire form as possible; also made a check list of the items to inspect at the site relative to the specific building).

3. Obtained a good map of the city so that the location of the apartment could be clearly identified, as well as the location of industrial operations, main highways, and so on.

4. Checked orientation of map, main streets and building orientation using a compass and transferred information to survey form.

5. Carried out a visual inspection of the building from the exterior:
   - Took photos (at least 2 of the exterior and additional photos of any other areas that might be relevant to the survey); recorded photo numbers on survey form.
   - Recorded as much data as possible and as called for on questionnaire
   - Recorded temperature, relative humidity, wind speed and wind direction on survey form.
   - Recorded outdoor CO, CO_2 and NO_2 levels as a baseline.

6. Carried out a general visual inspection of the 'common areas' of the building, including basement, furnace/boiler room, laundry room(s), garbage room(s), and other areas. Recorded data as called for on questionnaire, as well as other observations.

7. Selected, at random, double the number of apartment suites needed to perform occupant interviews (the additional numbers were to allow for 'no one at home', 'refusals', and so on). Recorded the location of all suites on the floor and elevation plans (drew a sketch if necessary) on form.

8. Carried out occupant interviews.

   Measured the 'typical' ambient temperature and relative humidity (RH) in each apartment suite surveyed. If there were specific complaints of IAQ in the occupants suite, requested permission to return at the end of the day to perform tests if deemed necessary. (If complaint currently existed, performed tests at time of initial visit).

9. Upon completion of the required number of interviews, analyzed/assessed information collected. Determined need to carry out IAQ tests. If deemed feasible to do tests, followed protocol for determining types and numbers of tests, and locations.

10. Carried out nominal IAQ tests (see Section 4.4).

11. Carried out required IAQ tests and carefully recorded all information.

    NOTE: • <u>All</u> information was carefully and clearly recorded on the appropriate form(s) <u>At Site</u>.

    • Re-measured temperature and RH at each suite being tested to coincide with IAQ tests.

12. Each apartment suite surveyed has its own survey form and IAQ test results if any were taken. All suite forms were placed in a special envelope labelled for the particular apartment building so that all data could remain organized.

SELECTING APARTMENT SUITES FOR OCCUPANT INTERVIEWS

The selection process generally involved 5% to 10% of the total number of suites in the building; for smaller buildings the occupants in no less than 5 suites were interviewed and for larger buildings occupants from no more that 14 suites were interviewed.

Suites were selected at random so as not to bias the survey by concentrating on potentially problematic areas (garbage rooms, laundry area, etc.); although these areas were tested when deemed necessary.

IAQ GAS TESTS

The following gases were tested for (using GASTEC Detector Tubes):

Gas	Sources
Carbon Monoxide	Combustion
Carbon Dioxide	Combustion, Humans, Pets
Formaldehyde	Insulation, New building materials, Furniture
Nitrogen Dioxide	Combustion, Cigarettes, Dryers
Ammonia	Cleaning fluids, cigarette smoke

Also, to coincide with the above tests, Ambient Temperature and Relative Humidity were recorded.

NOTE: A **TEST** refers to the procedure of performing all of the above GASTEC Detector Tube samples at one location as well as recording the ambient temperature and relative humidity.

SELECTING LOCATIONS FOR AIR QUALITY TESTS

Nominal Tests: A series of nominal tests (between 2 and 4 different locations) were always performed. Each test included a sampling of each of the gases listed above. These tests were performed in the common areas of the apartment building (entrance lobby/corridors) and were evenly distributed.

Perceived Problem Tests: All common areas (garage, laundry, lobby, corridors, ...) that were identified as having perceived complaints were tested.

If the occupant of a suite complained of poor IAQ in their suite, and the cause and symptoms were present at the time of the interview, a full set of IAQ tests in that suite were conducted at that time.

Once all interviews for the building were conducted, the responses for IAQ problems in the building were reviewed. When less than 10% of the results were positive, only the nominal tests were performed. When a particular area was identified as problematic the surveyor returned to those suites and performed IAQ tests. If IAQ problems appeared to be present, up to 50% of the suites that reported problems (minimum of 2) were selected and IAQ tests were performed.

NOTE: To avoid undue alarm, tests indicating poor air quality were not reported to the occupants.

APPENDIX B: Survey Forms

- General Building Survey Form
- Apartment Suite Survey Form
- Record of IAQ Tests Form

INDOOR AIR QUALITY IN APARTMENT BUILDINGS

GENERAL BUILDING SURVEY FORM (Winter Survey)

Address _____

_____

Name of Contact at Building _____

1. Form completed by 1) YL 2) AC 3) KR ..... ___1
2. Date ..... (YY MM DD) __ __ __
3. Location 1) Toronto 2) Ottawa 3) Windsor 4) Sudbury 5) Thunder Bay . ___3
4. OHC Building No. ..... ___4
5. Weather 1) Sunny (with clouds) 2) Overcast 3) Rain 4) Snow 5) Storm . ___5
6. Temperature ..... (°C)___5
   or (°F)___6
7. Relative Humidity ..... (%)___7
   or (°C WB)___7
   or (°F WB)___7
8. Wind Direction 1) N 2) E 3) S 4) W ..... ___8
9. Wind Speed ..... km/h ___9

BUILDING DETAILS

10. Approximate age (# years old) ..... ___10
11. No. of storeys ___11
12. No. of apts. per typical floor ..... ___12
13. Total no. of apts. in the building ___13

CONSTRUCTION

14. Slab Construction 1) Poured in place 2) Precast ..... ___14
15. Wall Construction 1) Brick 2) Steel 3) Aluminum 4) Wood ___15
16. Type of window frames 1) Aluminum 2) Steel 3) Vinyl ___16
17. Type of glazing 1) Single pane 2) Double pane 3) Double thermal .. ___17
18. Weatherstripped main doors? ..... 0) No 1) Yes ___18
19. Closure seals on suite doors? ..... 0) No 1) Yes ___19

HVAC

20. Heating system type 1) Hot Water 2) Hot water zoned ..... ___20
    3) Baseboard Electric 4) Electric radiant ceiling
21. Thermostats 1) in suites 2) in suites but most disconnected ..... ___21
    3) None (central control)
22. Make-up air system 0) None 1) not functional 2) Unheated 3) Heated ... ___22
    4) Operating spring/fall only, unheated
23. Kitchen Exhaust 0) None 1) Central, continuous ..... ___23
    2) Central, on timer 3) Local, manual
24. Bathroom Exhaust 0) None 1) Central, continuous ..... ___24
    2) Central, on timer 3) Local, manual

OTHER FEATURES

25. Garbage room location 1) Basement 2) Grnd floor 3) Outside ..... ___25

26. Laundry room location 1) Every floor 2) Basement 3) Grnd floor ..... ___26
4) Top floor 5) One floor below top

27. Underground Parking ..... 0) No 1) Yes ___27

28. Building is located in 1) Urban core 2) Suburban 3) Rural ..... ___28

29. Proximity to industry 0) None 1) ... 5) Very close and Heavy ..... ___29

30. Proximity to heavily travelled roads or highways
0) None 1) ... 5) Very close and Heavy ..... ___30

30. Proximity to Rivers/Lakes 0) None 1) ... 5) Very close and Heavy ..... ___31

Outdoor IAQ Test for CO, CO_2 and NO_2 (check when done) ..... ___

Film Log: Film # ____ Start Photo # ____ End Photo # ____

COMMENTS:

SKETCH:

INDOOR AIR QUALITY IN APARTMENT BUILDINGS

GENERAL BUILDING SURVEY FORM (Summer Survey)

OHC Building No. _____

Address _____

_____

1. Form completed by 1) YL 2) AC 3) KR ..... ___1
2. Date ..... (YY MM DD) __ __ __

3. Location 1) Toronto 2) Ottawa 3) Windsor 4) Sudbury 5) Thunder Bay . ___3
4. Weather 1) Sunny (with clouds) 2) Overcast 3) Rain 4) Snow 5) Storm . ___4
5. Temperature ..... (°C)___5
   or (°F)___5
6. Relative Humidity ..... (%)___6
   or (°C WB)___6
   or (°F WB)___6
7. Wind Direction 1) N 2) E 3) S 4) W ..... ___7

8. Wind Speed ..... km/h ___8

9. Name of Contact at Building _____9

_____

Outdoor IAQ Test for CO, CO_2 and NO_2 (check when done) ..... ___

Film Log: Film # ___ Start Photo # ___ End Photo # ___

Comments: Make specific comments with regard to changes in the building since March, 1989 (date winter survey was done). These changes could be operational or physical.

_____
_____
_____
_____
_____
_____
_____

INDOOR AIR QUALITY IN APARTMENT BUILDINGS

APARTMENT SUITE SURVEY FORM (Summer Survey)

(Winter survey form has only minor modifications)

1. Form completed by 1) YL 2) AC 3) KR ..... ___1

2. Date ..... (YY MM DD) __ __ __2

3. Time (24 hour time, e.g.: 5:30 p.m. = 17 30) ..... (HH MM) __ __3

Address _____

_____

4. City 1) Toronto 2) Ottawa 3) Windsor 4) Sudbury 5) Thunder Bay ..... ___4
5. OHC Apartment No. ..... ___5
6. Apartment Suite Floor ..... ___6
7. Apartment Suite No. (last 2 digits only) ..... ___7
8. Was this suite interviewed during last survey? 0) No 1) Yes ..... ___8
9. Temperature ..... (°C)___9
   or (°F)___9
10. Relative Humidity ..... (%)___10
    or (°G WB)___10
    or (°F WB)___10

Occupant Information

11. # Occupants ..... ___11
12. # Males ..... ___12
13. # Females ..... ___13
14. # Seniors (≥55 years of age) ..... ___14
15. # Adults (≥18 and <55 years of age) ..... ___15
16. # Children (<18 years of age) ..... ___16

17. # Smokers ..... ___17
18. Level of smoking 0) None ..... ___18
    1) Light (one light smoker)
    2) Medium (two light or one medium smoker)
    3) Heavy (two medium or one heavy smoker)
    4) Very Heavy (more than one heavy smoker)

19. Pets 0) None 1) Dog 2) Cat 3) Fish 4) Rodent 5) Bird ..... ___19

20. Does anyone suffer from allergies, asthma or any breathing disorders? 0) No 1) Yes .. ___20
    Specify _____

Apartment Information

21. No. of Bedrooms ..... ___21

22. Location of suite in building ..... ___22
1) N 2) NE 3) E 4) SE
5) S 6) SW 7) W 8) NW

Use/Operation of Apartment Suite (0 if no fan or vent) 0) No 1) Yes

23. Is the kitchen exhaust fan malfunctioning or backdrafting? ..... ___23
24. Is the bathroom exhaust fan malfunctioning or backdrafting? ..... ___24

Test with smoke pencil to determine direction of draw.

Comments: _____

_____

25. Approximate no. of meals per week ..... ___25
26. Approximate no. of showers and baths per week ..... ___26

0) No 1) Yes

27. Use of humidifier in winter ..... ___27
28. Use of supplemental heating ..... ___28
29. Use of window air conditioners ..... ___29
30. Use of ammonia or ammonia based cleaning materials ..... ___30
31. Use of air fresheners ..... ___31
32. Washing machine in apartment suite ..... ___32
33. Dryer in apartment suite ..... ___33
34. Do you hang dry clothes in suite ..... ___34
35. Use of clothes softeners ..... ___35
36. Has suite been repainted in the last 6 months ..... ___36
37. Are windows open for long periods ... in summer ..... ___37
38. in winter ..... ___38

Observations/Perceptions of Occupants

Do you notice any problem with Indoor Air Quality

39. a) In your apartment ..... ___39
40. Is it ever bothersome ..... ___40
41. When 0) Never 1) All Year 2) Summer 3) Winter ..... ___41
4) Occasional 5) Other
42. Time 0) Never 1) Morning 2) Afternoon 3) Evening ..... ___42
4) Meal time 5) All Day 6) Windy 7) Other
43. Describe 0) None 1) Food 2) Auto 3) Bathroom ..... ___43
4) Industry 5) Dry 6) Humid 7) Dusty
8) Smoky 9) Garbage 10) Neighbours 11) Others
44. Summer air quality ranking
0) No Problems 1) Minor 2) Moderate 3) Severe ..... ___44

0) No 1) Yes

45. b) In other parts of the building ..... ___45

46. Is it ever bothersome ..... ___46

47. Where 1) Halls 2) Stairwells 3) Lobby ..... ___47
4) Common Rooms 5) All Areas

48. When 0) Never 1) All Year 2) Summer 3) Winter .... ___48
4) Occasional

49a. Time 0) Never 1) Morning 2) Afternoon 3) Evening ... ___49a
4) Meal time 5) All Day 6) Windy 7) Other

49b. Describe 0) None 1) Food 2) Auto 3) Bathroom .. ___49b
4) Industry 5) Dry 6) Humid 7) Dusty
8) Smoky 9) Garbage 10) Neighbours 11) Others

50. Summer air quality ranking
0) No Problems 1) Minor 2) Moderate 3) Severe .... ___50

Summer perceptions only for questions 51 to 54.

51. Moisture/Humidity
0) No Problem 1) Minor 2) Moderate 3) Severe ..... ___51

52. Dry Static Air
0) No Problem 1) Minor 2) Moderate 3) Severe ..... ___52

53. Odour in Kitchen
0) None 1) Mild 2) Moderate 3) Heavy ..... ___53

54. Odour in Bathroom
0) None 1) Mild 2) Moderate 3) Heavy ..... ___54

SURVEYOR'S OBSERVATIONS

55. Cleanliness of Suite 0) Very Clean 1) Clean 2) Moderately Clean ..... ___55
3) Dirty 4) Very Dirty

Comments:

RECORD OF IAQ TESTS

1. Date: ..... (YY MM DD) __ __ __1
2. Time (24 hour time, i.e., 5:30 p.m. = 17 30): ..... (HH MM) __ __2
   Address: _____
3. City: 1) Toronto 2) Ottawa 3) Windsor 4) Sudbury 5) Thunder Bay ..... ___3
4. OHC Building No.: ..... ___4
5. Location in Building: 0) In a suite (Suite # _____) 1) Outdoors 2) Lower Floors 3) Middle Floors 4) Upper Floors ..... ___5
6. Temperature: ..... (°C) ___ or (°F) ___6
7. Relative Humidity: ..... (%) ___ or (°C WB) ___7 or (°F WB) ___7
8. Perceived Air Movement: 0) None 1) Very Light 2) Light (< 5km/h) 3) Moderate (5-15 Km/h) 4) Heavy (>15 Km/h) ..... ___8

TEST	GAS SAMPLE	TEST RANGE (ppm)	# OF STROKES	STROKE TIME	COLOUR CHANGE	READING	CORRECTED READING	COMMENT
1	CARBON MONOXIDE	5 - 50	2	2 MIN.	YELLOW TO DARK BROWN			
	COMMENT:							
2	CARBON DIOXIDE	4600 - 11500	1/2	3 MIN.	WHITE TO PURPLE			
		300 - 5000	1					
		100 - 300	3					
	COMMENT:							
3	FORMALDEHYDE	0.2 - 5	5	30 SEC.	YELLOW TO REDDISH BROWN			
	COMMENT:							
4	NITROGEN DIOXIDE	30 - 100	1	1 MIN.	WHITE TO YELLOWISH ORANGE			
		1 - 30	2					
		0.2 - 1	8					
	COMMENT:							
5	AMMONIA	30 - 60	1/2	1 MIN.	PURPLE TO YELLOW			
		2 - 30	1					
		1 - 2	2					
	COMMENT:							
6	OZONE	0.6 - 3	1	30 SEC.	PALE BLUE TO WHITE			
		0.1 - 0.6	5					
		0.05 - 0.1	10					
	COMMENT:							

APPENDIX C: General Descriptions and Photographs of Surveyed Apartment Buildings

C. GENERAL DESCRIPTIONS OF SURVEYED APARTMENT BUILDINGS

Following is a brief description of the fifteen buildings surveyed for this project. The level of detail may vary depending on the availability of data at the time of the site visit. Site location, building age and construction, and mechanical system details are highlighted to familiarize the reader with the building stock survey. (Note: The accuracy of the data collected relating to the general building details is highly dependant on the knowledge of the building staff consulted at the time of each building survey.)

Toronto - OH-76 - 2821 Birchmount Road

This is a twelve storey family apartment building located at the corner of Birchmount and Finch in North Scarborough. The building is approximately five km North of the McDonald Cartier Highway (Route 401) and is in a suburban area. There are 239 suites with 20 suites on each typical floor. The building was built around 1969 (20 years old). Its construction is cast in place concrete slabs with concrete block infill wall and brick veneer. The interior finish of the apartment suites is drywall on studs. The windows are aluminum with fixed double pane above and double sliders below. Heat is provided to the suites via a hot water system (eight boilers, four each serving two zones - East and West). Heat to the suites is controlled by a central system which is monitoring temperature sensors that have been installed in approximately 10 suites in both the East and West zones. There are no thermostats in the suites themselves; the occupants have no control over their own radiators. There are two fresh air make-up units serving the corridors (North hall and South hall) that are supplying unconditioned air on a continuous basis. Exhaust fans are located on the roof drawing from the bathrooms and kitchen twelve hours of the day.

Toronto - OH-84 - 30 Falstaff

This is a nineteen storey family apartment building located at the corner of Falstaff and Jane at the South East corner of the 401 and 400 interchange in a suburban area. There are 224 suites with 19 suites on each typical floor. The building was built in 1972 (17 years old). Its

construction is cast in place concrete slabs with concrete block infill wall and brick veneer. The interior finish of the apartment suites is drywall on studs. The windows are aluminum with fixed double pane above and below and double sliders in between. Heat is provided to the suites via a hot water system (ten boilers, five each serving two zones - East and West). Heat to the suites is controlled by a central system which is monitoring four temperature sensors in each zone and averaging the load to determine the supply heat for that zone. There are no thermostats in the suites themselves; the occupants have no control over their own radiators. There are two fresh-air make-up units serving the corridors (North hall and South hall) that are supplying unconditioned air on a timed schedule (although the air is unconditioned, the make-up units have the capability to preheat the air; the preheating has been turned off for the past five years for energy conservation reasons). The make-up air systems will shut down if the outside air temperature goes below a preset minimum; this is to avoid over cooling the corridors. Three bathroom exhaust fans are located on the roof drawing from the suites between 6 am and 11 pm There are no kitchen exhaust fans; however all kitchens have windows.

Toronto - OH-88 - 285 Shuter Street

This is a fifteen storey family apartment building located on Shuter street, between Sherbourne and Parliament in the Toronto urban core. There are 301 suites with 22 suites on each typical floor and thirteen two storey condominium style apartments occupying the 1st and 2nd floors. The building was built in 1964 (25 years old). Its construction is cast in place concrete slabs with concrete block infill wall and brick veneer. The interior finish of the apartment suites is drywall on studs. The windows are aluminum with fixed double pane between two sets of double sliders. Heat is provided to the suites via a hot water system (six boilers operating in series - no zoning). Heat to the suites is controlled by a central system which is monitoring 16 sensors on the 3rd and 4th floor to determine the supply heat for the building. There are no thermostats in the suites themselves; the occupants have no control over their own radiators. There are two fresh air make-up units with return air (percent of outside air is unknown) serving the corridors (East hall and South hall) that are supplying conditioned air on a timed schedule. Four bathroom and four kitchen exhaust fans are located on the roof drawing from the suites 24 hours per day.

Toronto - OH-168 - 85 Spencer Avenue

This is a seven storey seniors apartment building located on Spencer Avenue just North of the Gardener Expressway in a suburban area. There are 57 suites with 9 suites on each typical floor. The building was built in 1975 (14 years old). Its construction is cast in place concrete slabs on concrete block. The wall construction is 4 in. face brick, 4 in. concrete block, 2 in. styrofoam and 2 coats of drywall. The windows are aluminum with fixed double thermal pane above double sliders. Heat is provided via baseboard electric heaters individually controlled by each tenant. There is one fresh air make-up unit. This unit is operated only in the Spring, Summer, and Fall. It is turned off during the Winter from Christmas to mid Spring when the weather becomes more seasonable. The make-up unit has the ability to condition the air, however it is never used. Both bathroom and kitchen exhaust fans are located locally in each apartment suite and are vented directly outside at each suite; the tenants control the operation of these fans via a wall mounted switch.

Toronto - OH-98 - 5 Bellevue Crescent

This is a twenty-one storey family and seniors apartment building located on Bellevue Crescent at the corner of Lawrence Avenue and Weston Road. There are 326 suites with 21 suites on each typical floor. The building was built in 1971 (18 years old). Its construction is cast in place concrete slabs with concrete block infill wall and brick veneer. The windows are aluminum with double sliders. Heat is provided to the suites via a hot water system (eight boilers, one zone). There are thermostats in all suites but in most cases they have been disconnected by the maintenance staff and the heating valves in the suites left in the open position. There are four make-up air units supplying conditioned air to the corridors. Two of the make-up units, on the roof, serve the North and South wings of floors 8 to 22, and two, in the basement, serve the North and South wings of floors 1 to 7. All make-up units are on timers; the units supplying floors 8 to 22 operate continuously between 6 a.m. and 10 p.m., while the units supplying floors 1 to 7 operate 24 hours per day. Bathroom exhaust is provided by six roof mounted fans. Two fans operate 24 hours and four fans operate on a 12 hour cycle. Kitchen exhaust fans are

mounted locally (they exhaust directly outside the apartment) and the occupant has local control via a wall mounted switch.

Ottawa - OH-9 - 1180 Shillington Avenue

This is a three storey walk-up family apartment building located on Shillington Avenue off Merivale Road. There are 30 suites with 10 suites per floor. The building was built in 1972 (17 years old). Its construction is cast in place concrete slabs with concrete block infill wall and brick veneer. The windows are aluminum with double sliders. Heat is provided to the suites via a hot water system (two boilers, one zone). Tenants have control over heat in their suites via wall mounted thermostats. There is one gas fired make-up air unit supplying conditioned air to the corridors; it is operating between 6 am and 10 pm. There are bathroom exhaust fans in each suite that are manually operated and ducted directly to the outside. There are no kitchen exhaust fans in suites.

Ottawa - OH-18 - 1065 Ramsay Crescent

This is a fourteen storey family apartment building located on Ramsay Crescent near the Pinecrest/Queen's Way intersection in the Ottawa West end. There are 208 suites with 16 suites on each typical floor. The building was built in 1973 (16 years old). Its construction is cast in place concrete slabs with concrete block infill wall and brick veneer. The windows are aluminum with double sliders above a fixed double pane. Heat is provided to the suites via a hot water system (three boilers serving two zones modulated through a three way valve). Thermostats in all suites provide local control for tenants. One make-up air unit supplying conditioned air to the corridors and two central bathroom exhaust fans serve building. Operation of the make-up system is tied to the schedule of the central bathroom exhausts (6 am to 9 am, 11 am to 2 pm, 4 pm to 7:30 pm). End units (four corners of the building) have manually operated bathroom exhaust fans that are ducted directly to the outdoors. There are no kitchen exhaust fans in the building.

Ottawa - OH-50 - 160 Charlotte Street

This is a fourteen storey seniors apartment building located on the corner of Charlotte Street and Rideau Street, just on the West bank of the Rideau River and East of the downtown core. There is a pulp and paper mill approximately 2 km north of the building on the Ottawa River. There are 216 suites with 14 suites on each typical floor. The building was built in 1975 (14 years old). Its construction is cast in place concrete slabs with prefabricated metal infill wall assemblies. Fifty percent of the buildings windows have been upgraded. The original windows are aluminum single pane with double sliders. The new windows are aluminum frames with double thermal pane glass and double sliders. The building is heated via baseboard electric heaters in all suites and controlled by room thermostats (typically 2 per suite). One make-up air unit supplies electrically conditioned air to the corridors (temperature sensor after the coil controls staging for preheating the air). Operation of the make-up system is from 9 am to 11 am, 2 pm to 4 pm and 7 pm to 9 pm. One manually operated exhaust fan in each suite simultaneously exhausts both the kitchen and the bathroom (a three-way switch in both the bath and kitchen allow the user to turn on and off the fan from either location).

Windsor - OH-1 - 445 Glengarry Avenue

This is a six storey family apartment building located near the corner of Glengarry Avenue and University Avenue in the downtown core and 1 km south of Detroit and the Detroit River. There are 132 suites with 22 suites on each typical floor. The building was built in 1965 (24 years old). Its construction is cast in place concrete slabs with lintels and infill wall assembly with face brick on concrete block. The windows are new aluminum single pane double sliders with seals. The building is heated via electric coils mounted in the ceiling of the suites and controlled by room thermostats in every room. There are no make-up air units or kitchen exhaust fans serving the building. Central Bathroom exhausts serve the entire building and run 24 hours per day.

Windsor - OH-3 - 333 Glengarry Avenue

This is an eight storey seniors apartment building located on the corner of Glengarry Avenue and University Avenue in the downtown core and 1 km from Detroit and the Detroit River. There are 135 suites with 17 suites on each typical floor. The building was built in 1966 (23 years old). Its construction is cast in place concrete slabs with lintels and infill wall assembly with face brick on concrete block. The windows are aluminum single pane above double sliders. The building is heated via electric coils mounted in the ceiling of the suites and controlled by room thermostats in every room. One bathroom exhaust and one kitchen exhaust serve the entire building and run 24 hours per day.

Sudbury - OH-15 - 401 Rumball Terrace
and
Sudbury - OH-16 - 201 Rumball Terrace

These two addresses comprise one actual building divided by a fire-wall and stairwell. OH-15 is a twelve storey family building and OH-16 is an eleven storey senior apartment building. The building is located on Rumball Terrace off Main Street in the South end of Sudbury. There are 162 suites in OH-15 with 14 suites on each typical floor and 101 suites in OH-16 with 10 suites on each typical floor. The building was built in 1972 (17 years old). Its construction is cast in place concrete slabs with infill wall assembly. The wall construction is steel cladding on face brick, concrete block, strapping and drywall inside finish. The windows are aluminum with double sliders above a fixed double pane. Heat is provided to the suites via a hot water gas fired system with baseboard radiators in the suites. Thermostats in all suites provide local control for tenants. Separate make-up air units for each half of the building supply conditioned air to the corridors and central separate bathroom exhaust fans serve each half of the building. OH-16 has local, manually operated kitchen exhaust fans in all suites.

Thunder Bay - OH-1 - 500/516/548/568/584/592 James Street

This complex is comprised of six fourplexs (24 units); where, in each fourplex two units occupy the ground floor, two the second floor, and the laundry room and storage are in the basement. These fourplexs are located on James Street North in the North West end of Thunder Bay. The buildings were built in 1971 (18 years old). There is a pulp and paper mill approximately 5 km away, the Neebling River less than 1 km away, and Lake Superior 1 km away. The construction is pre-cast concrete slab with brick on block walls. The windows are aluminum with double sliders below fixed double pane. Heating for the units is baseboard electric individually controlled by thermostats. Manually operated bathroom and kitchen exhaust fans are in all units. There is no fresh air make-up system in any of the buildings.

Thunder Bay - OH-3 - 75 Academy Drive

This is a three storey family apartment building located on the corner of Academy Drive and Ravenwood Street, 5 km from a pulp and paper mill, near the airport, 1 km from highway #130 and 1 km from Lake Superior. There are 29 suites with 10 suites on each typical floor. The building was built in 1974 (15 years old). Its construction is pre-cast concrete slabs with textured concrete block walls. The windows are fixed double glazed thermal pane with wood hoppers. The building is heated via electric baseboard heaters with thermostats in each room. Each suite has manually operated bathroom and kitchen exhaust fans which are ducted to common stacks. Due to moisture problems and roof leaks a new wood trussed pitched roof was added on top of the existing flat roof in 1987.

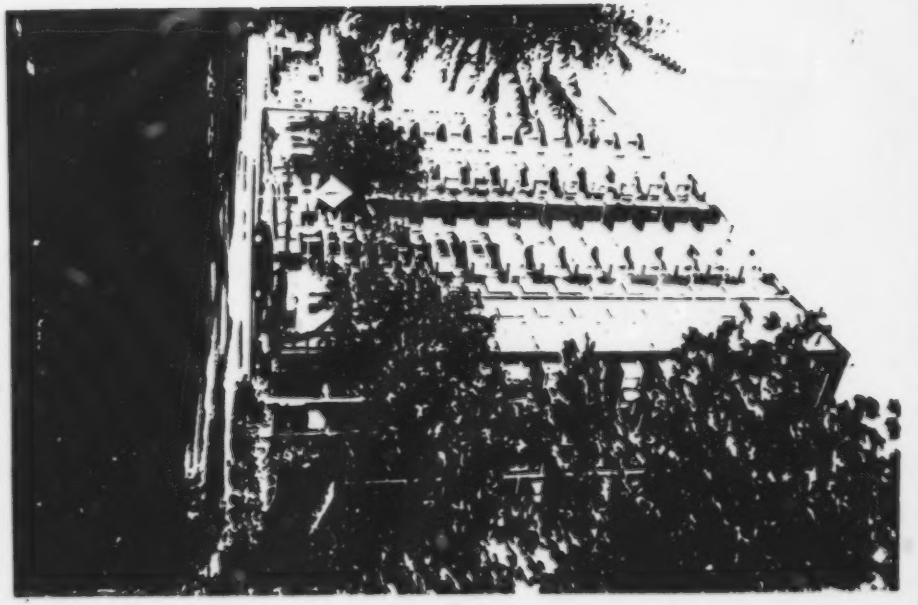
Thunder Bay - OH-4 - 544 North Court Street

This is a seven storey seniors apartment building located on North Court Street less that 1 km from Lake Superior. There are 60 suites with 9 suites on each typical floor. The building was built in 1971 (18 years old). Its construction is cast in place concrete slabs with concrete block infill wall and brick veneer. The windows are fixed double glazed panes above double sliders. The building is heated via electric baseboard heaters with thermostats in each room. The make-

up air unit supplying the corridors operates on a 12 hours per day with an outdoor air temperature shut-off of 15 deg F. Each suite has a manually operated kitchen exhaust fan which is ducted directly outside. A common bathroom exhaust fan for the entire building operates on a timer.

BUILDING PHOTOGRAPHS

1) Toronto OH-76, 2821 Birchmount Road
2) Toronto OH-84, 30 Falstaff
3) Toronto OH-88, 285 Shuter Street
4) Toronto OH-168, 85 Spencer Avenue
5) Toronto OH-98, 5 Bellevue Crescent
6) Ottawa OH-9, 1180 Shillington Avenue
7) Ottawa OH-18, 1065 Ramsay Crescent
8) Ottawa OH-50, 160 Charlotte Street
9) Windsor OH-1, 445 Glengarry Avenue
10) Windsor OH-3, 333 Glengarry Avenue
11/12) Sudbury OH-15/16, 201/401 Rumball Terrace
13/14) Thunder Bay OH-1, 501/516/548//568/584/592 James Street
15) Thunder Bay OH-3, 75 Academy Drive
16) Thunder Bay OH-4, 544 North Court Street



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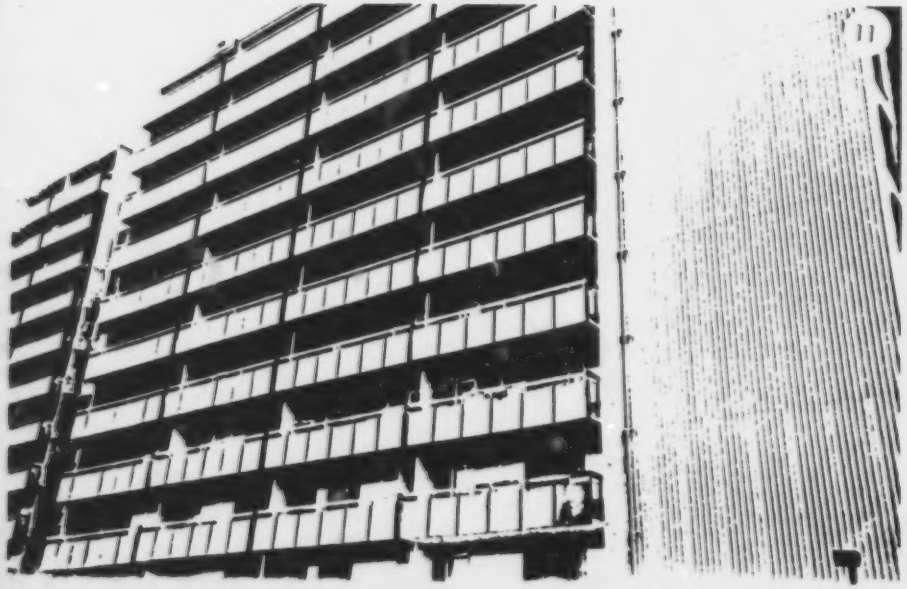

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APPENDIX D: Discussion on IAQ Indicators

D. DISCUSSION ON IAQ INDICATORS

This survey has chosen to concentrate on five commonly found pollutants in residential indoor air. The concentrations of these pollutants compared to Health and Welfare Canada guidelines will provide a basis for identifying poor indoor air quality.

Although not generally considered a pollutant, certain limits for temperature and relative humidity must be observed to maintain the comfort and health of building occupants. Levels of humidity and temperature in the extreme ranges can not only affect the well being of the occupants, but also the condition and durability of building materials.

Following is a brief discussion of the indicators of IAQ taken into concern in this report. The facts and figures have been extracted from: *Exposure Guidelines for Residential Indoor Air Quality*, Health and Welfare Canada, The Federal-Provincial Advisory Committee on Environmental and Occupational Health; and *Indoor Air Pollution and Housing Technology*, Canada Mortgage and Housing Corporation, Policy Development and Research Sector. Table D.1 provides a summary of exposure guidelines and target limits for the pollutants in question.

TABLE D.1: RECOMMENDED LEVELS OF MEASURED POLLUTANTS

Pollutant	Target	Health & Welfare Canada Res. Exposure Limits[2]
Carbon Monoxide - CO	< 10 ppm	11 ppm
Carbon Dioxide - CO_2	< 800 ppm	3500 ppm
Nitrogen Dioxide - NO_2	< 0.05 ppm	0.052 ppm
Formaldehyde - HCHO	< 0.05 ppm	0.10 ppm
Ammonia - NH_3	< 10 ppm	25 ppm *
Ozone - O_3	< 0.05 ppm	0.1 ppm *

* Represents the Threshold Limit Value (TLV) adopted by American Conference of Governmental Industrial Hygienists.

[1] Taken from Health and Welfare Canada - *Exposure Guidelines for Residential Indoor Air Quality*, The Federal-Provincial Advisory Committee On Environmental and Occupational Health.

Carbon Monoxide (CO)

Sources of CO in indoor air include gas and oil appliances, tobacco smoke, and the infiltration of CO in polluted outdoor air. Groups that may be at particular risk from the effects of CO exposure include those with cardiovascular, cerebrovascular and peripheral vascular diseases, foetuses, the newborn, pregnant women and individuals living at high altitudes.

The acceptable short-term exposure ranges for carbon monoxide in residential indoor air are[1]:

< 11 ppm - 8 hour average concentration

< 25 ppm - 1 hour average concentration

Carbon Dioxide (CO_2)

Major sources of CO_2 are gas stoves and unvented kerosene heaters. In poorly ventilated rooms human metabolism alone can cause levels in excess of 3000 ppm. Subjective symptoms such as fatigue, headaches and an increased perception of warmth and unpleasant odours have been associated with CO_2 levels of 500 to 3200 ppm. The lowest level at which adverse health effects have been observed in humans is 7000 ppm.

The acceptable long term exposure range for carbon dioxide in residential indoor air is < 3500 ppm[1].

Nitrogen Dioxide (NO_2)

Primary outdoor sources of NO_2 are vehicular and industrial omissions. Indoors, gas stoves and unvented combustion appliances are the major sources of NO_2. Symptoms range from an increased prevalence of respiratory illness in adults and children chronically exposed to mean levels of 0.10 ppm to detrimental respiratory effects when exposed for brief periods to

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[1] Taken from Health and Welfare Canada - *Exposure Guidelines for Residential Indoor Air Quality*, The Federal-Provincial Advisory Committee On Environmental and Occupational Health.

concentrations of approximately 0.5 ppm. The acceptable long term and short term exposure ranges for nitrogen dioxide in residential indoor air are[1]:

< 0.052 ppm - long term
< 0.25 ppm - 1 hour average concentration, short term

Formaldehyde (HCHO)

Man-made sources of HCHO include combustion, and decomposition of formaldehyde resins used in wood, paper, textiles, urea-formaldehyde foam insulation (UFFI), and in tobacco smoke and other forms of combustion products. Formaldehyde gas is a sensory irritant, primarily affecting the nasal passages, respiration and the eyes.

The recommended exposure guidelines for HCHO in residential indoor air are[1]:

Action Level: 0.10 ppm
Target Level: 0.05 ppm

Ammonia (NH_3)

Major indoor sources of ammonia are human metabolic activity, household cleaning products, and to some degree tobacco smoke. Outdoor sources include combustion fuels, incineration of waste products, and chemical plants. The main atmospheric source of NH_3 is from natural processes on land and in the oceans. Symptoms of inhaled ammonia are irritation of the upper respiratory tract, sneezing and salivation. High or prolonged exposure can cause serious eye damage and induce pulmonary edema.

The American Conference of Governmental Industrial Hygienists has adopted a Threshold Limit Value (TLV) of 25 ppm.

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[1] Taken from Health and Welfare Canada - *Exposure Guidelines for Residential Indoor Air Quality*, The Federal-Provincial Advisory Committee On Environmental and Occupational Health.

Ozone (O_3)

Infiltration of outdoor air is the principal source of ozone in indoor air. Indoor generated sources of ozone are, electric arcing (e.g. in electrostatic precipitators or from electric motors), and ultraviolet light sources. Ozone causes coughs, chest discomfort, and irritation of the nose, throat and trachea.

The acceptable short term exposure range for ozone in residential indoor air is < 0.12 ppm - one hour average concentration[1].

Temperature and Relative Humidity

Although temperature and relative humidity are not direct measures of air quality, their values have a profound effect on the comfort and health of the occupants of residential dwellings. Through independent studies and studies funded by ASHRAE, the ANSI/ASHRAE Standard 55-1981 - Thermal Environmental Conditions for Human Occupancy has been developed. This standard defines thermal comfort as "that condition of mind which expresses satisfaction with the thermal environment." See Figure D.1 for the psychrometric bounds of the comfort zone defined by the standard.

The main indoor sources of water vapour are human and animal metabolism, bathing, cooking, and washing and drying of clothes. Long periods of low RH are believed to cause dryness of the skin and mucous membranes, which may lead to increased chapping and irritation. High humidity at high temperatures lead to increased sweating and a loss of electrolytes from the blood; prolonged exposures may lead to heat exhaustion or heat stroke. At risks from high RH may be those suffering from cardiovascular diseases, newborns, and the elderly. Low RH is of particular concern to asthma sufferers. Several species of bacteria and viruses survive best at low or high, rather than intermediate humidities.

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[1] Taken from Health and Welfare Canada - *Exposure Guidelines for Residential Indoor Air Quality*, The Federal-Provincial Advisory Committee On Environmental and Occupational Health.

Although exposure to high or low levels of RH are unlikely to affect the health of most people, Health and Welfare has suggested the following acceptable short term exposure ranges for water vapour in residential indoor air[1]:

30% to 55% relative humidity - winter (unless constrained by window condensation)
30% to 80% relative humidity - summer

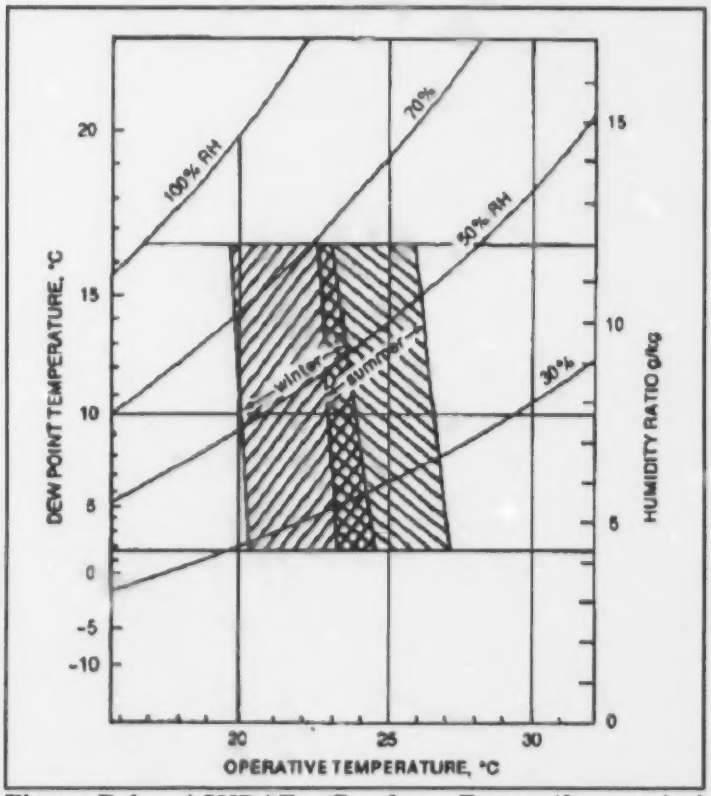

Figure D.1: ASHRAE Comfort Zone (for typical seasonal clothing and light activity)

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[1] Taken from Health and Welfare Canada - *Exposure Guidelines for Residential Indoor Air Quality*, The Federal-Provincial Advisory Committee On Environmental and Occupational Health.

APPENDIX E: Supplementary Figures of Compiled and Analyzed Data

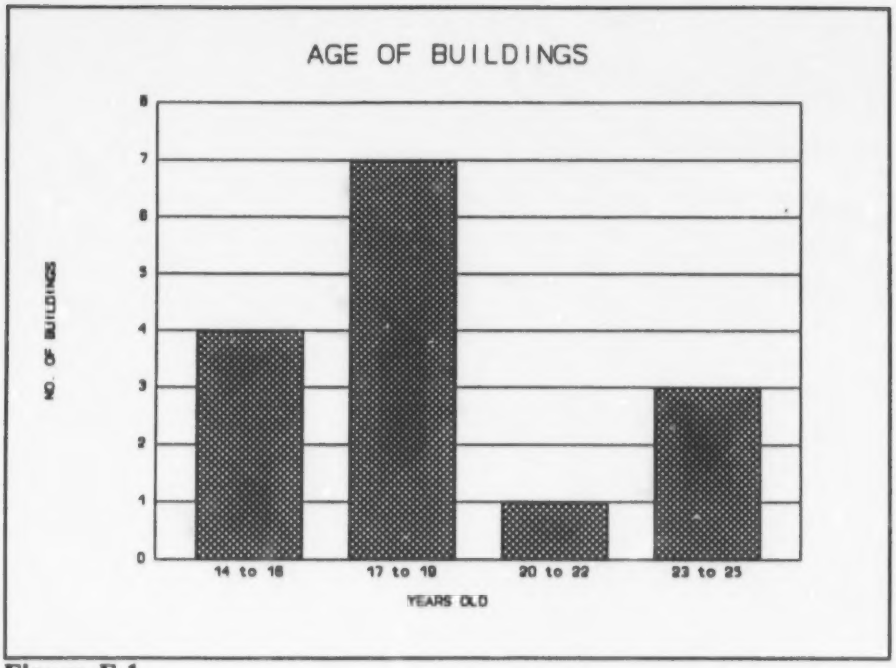

Figure E.1

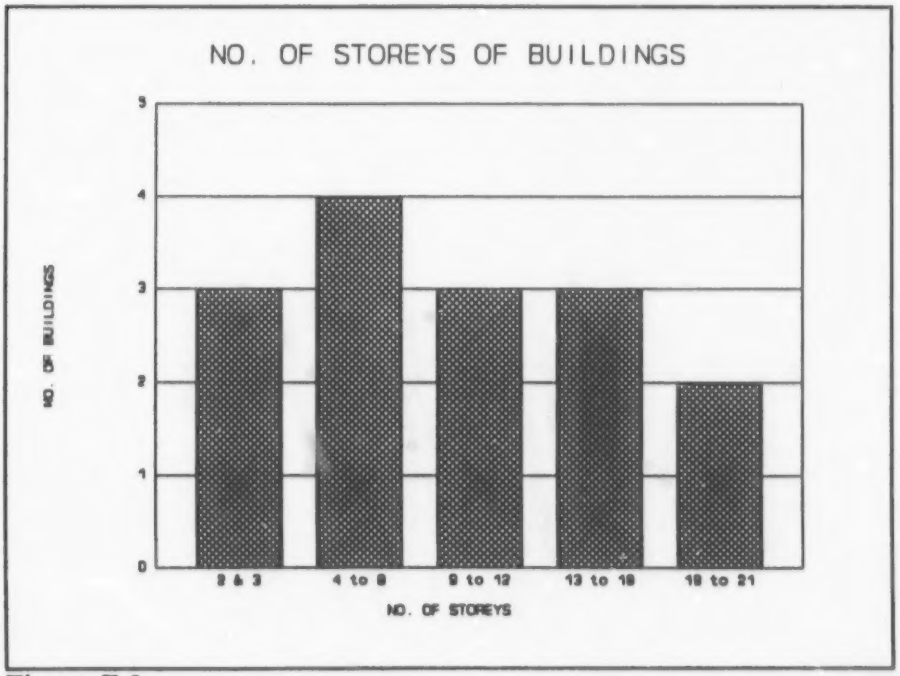

Figure E.2

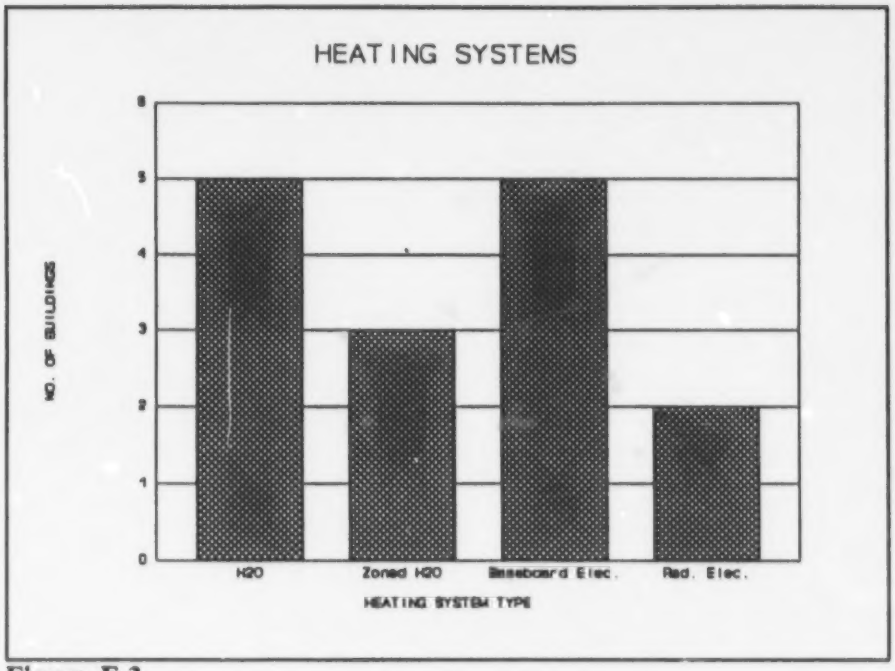

Figure E.3

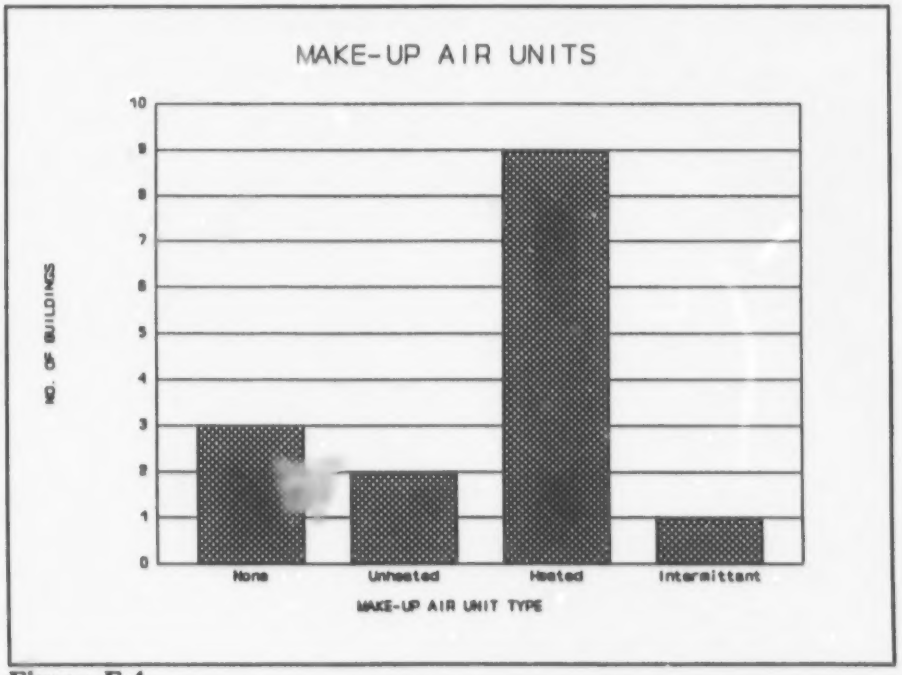

Figure E.4

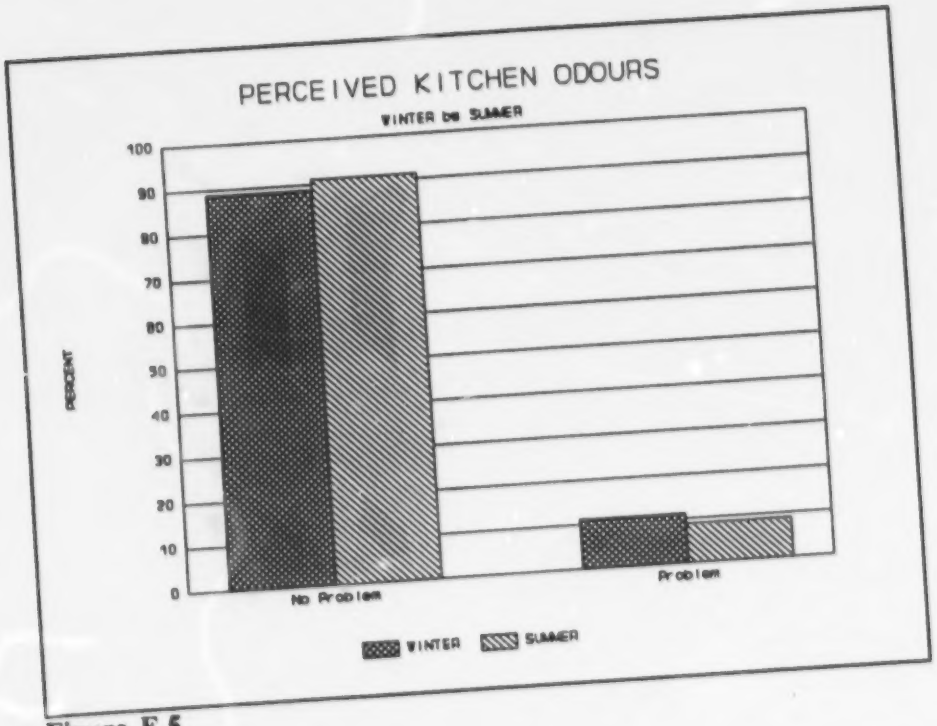

Figure E.5

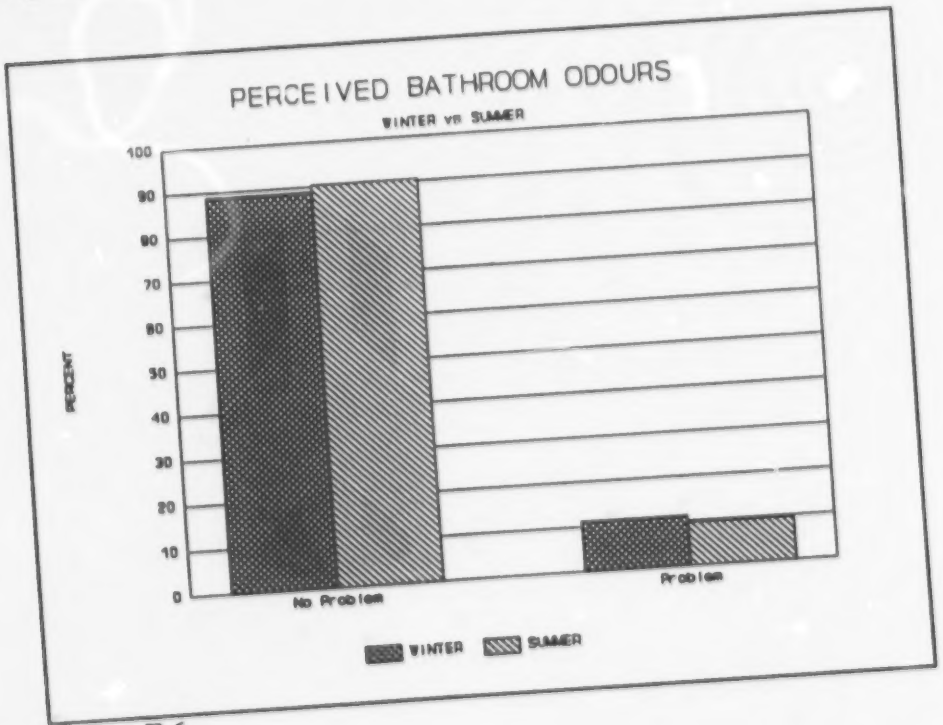

Figure E.6

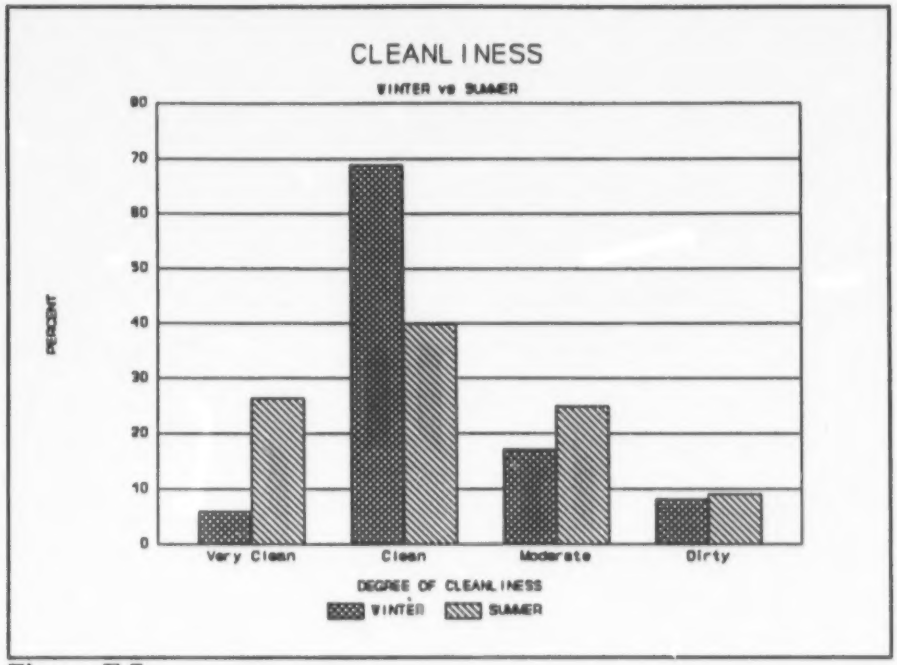

Figure E.7

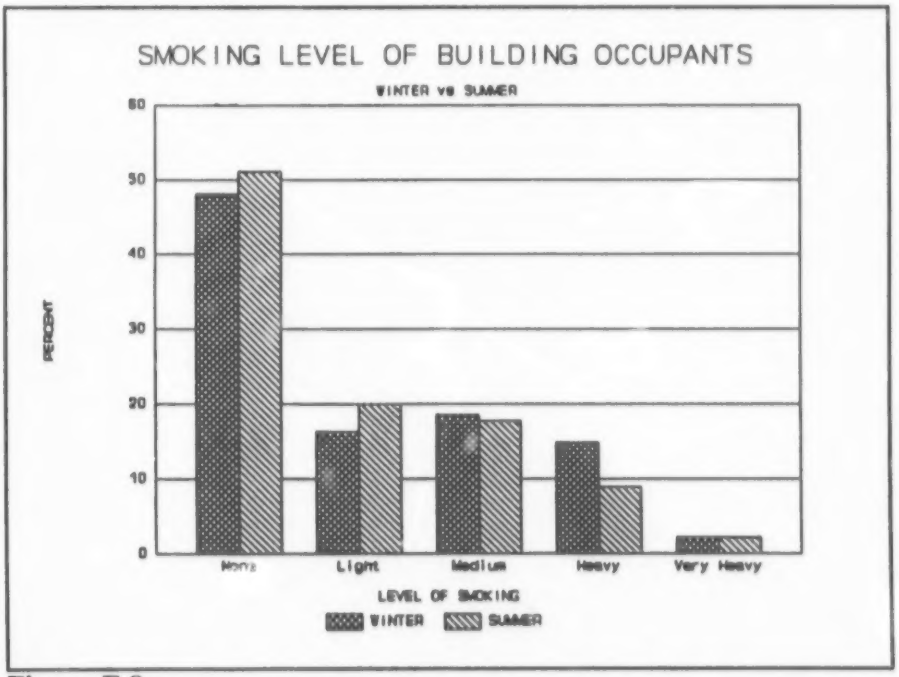

Figure E.8

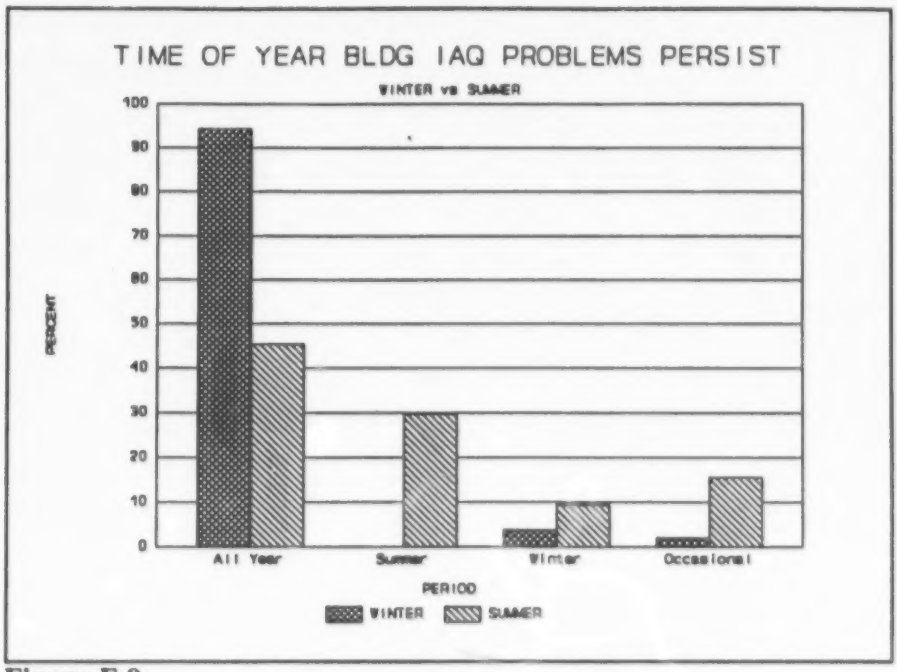

Figure E.9

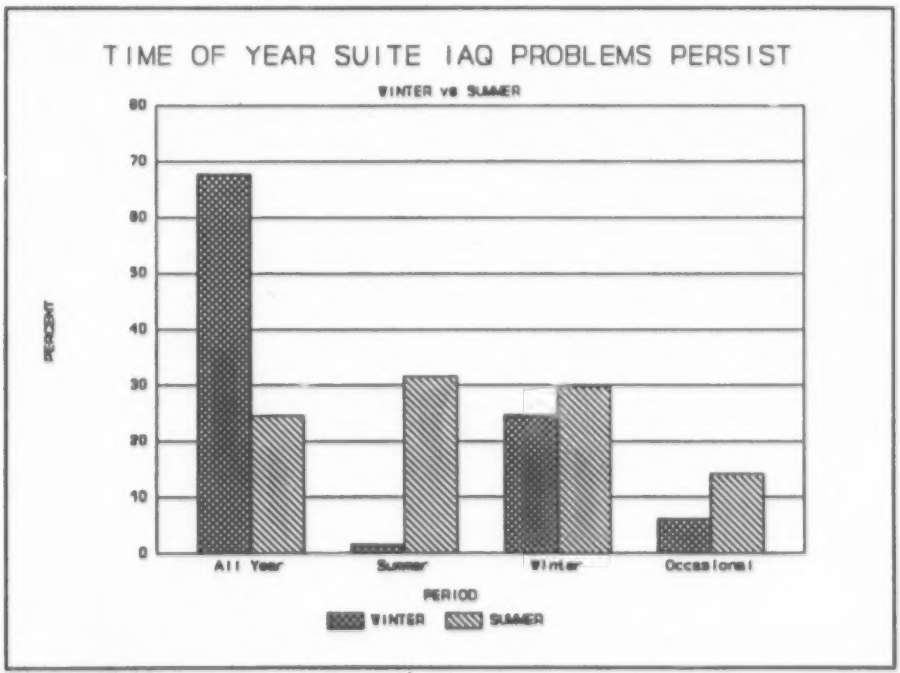

Figure E.10

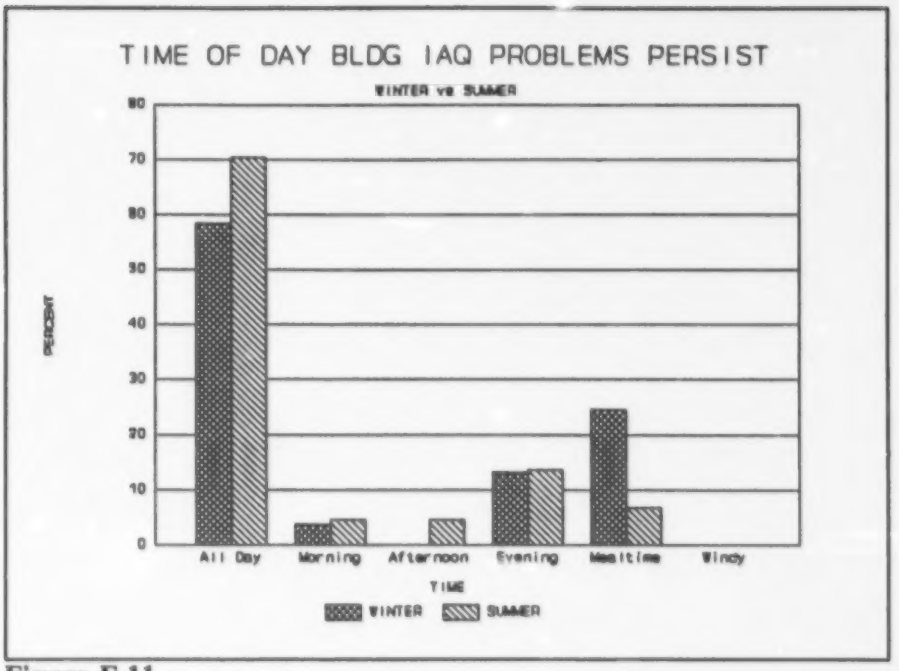

Figure E.11

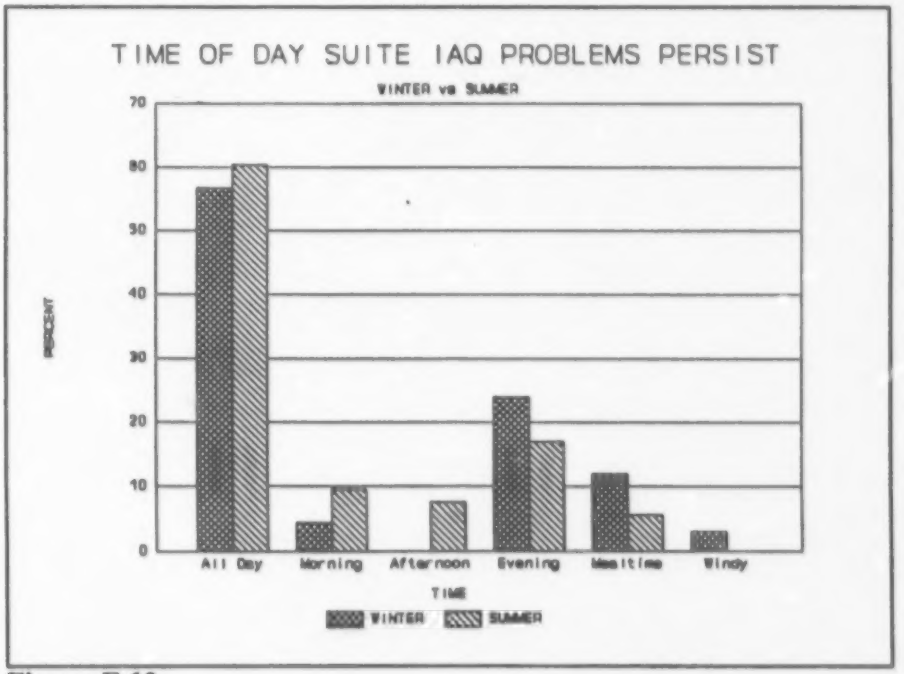

Figure E.12

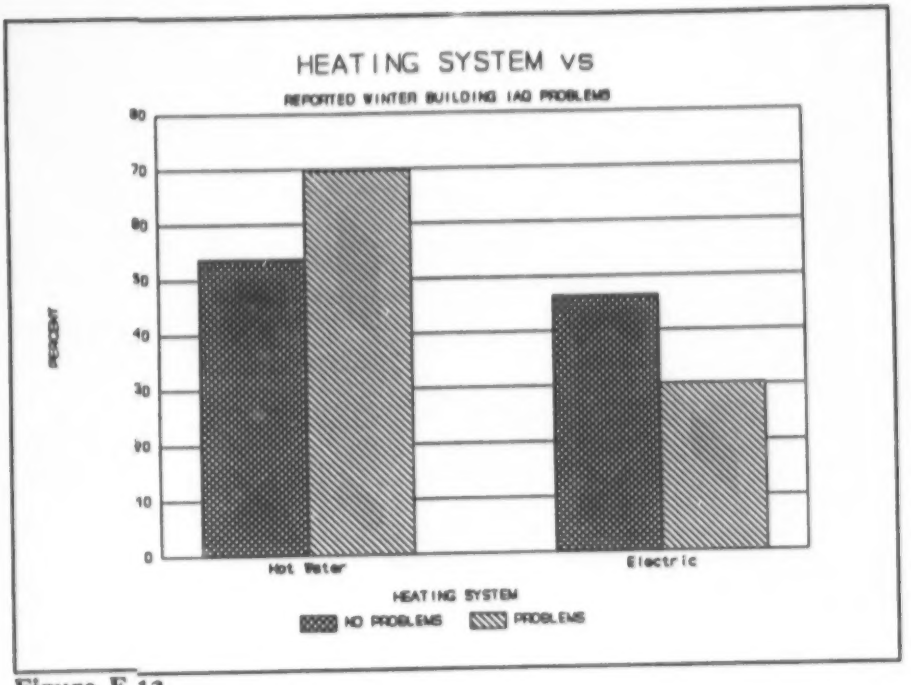

Figure E.13

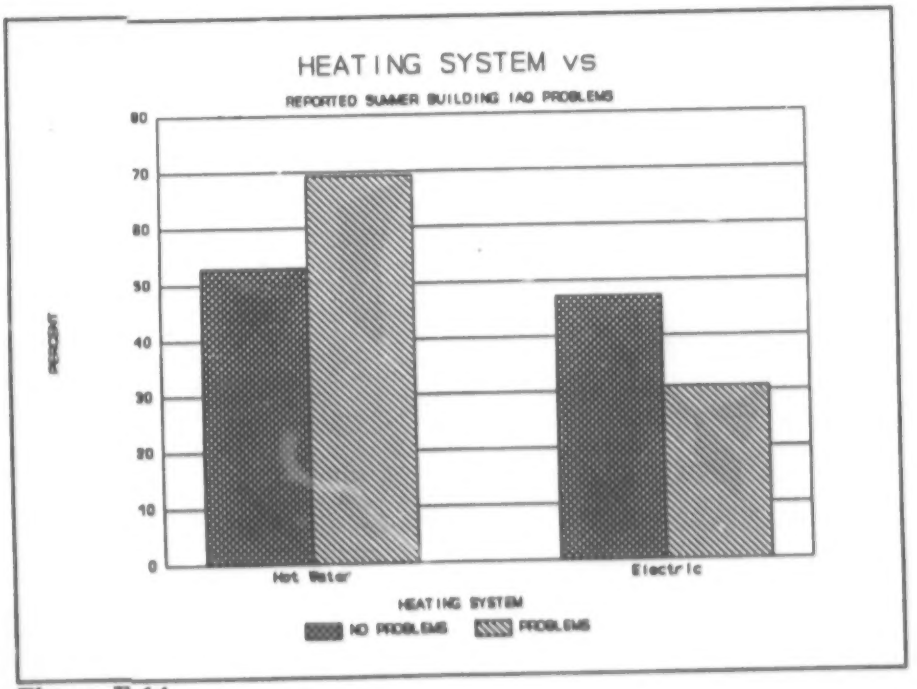

Figure E.14

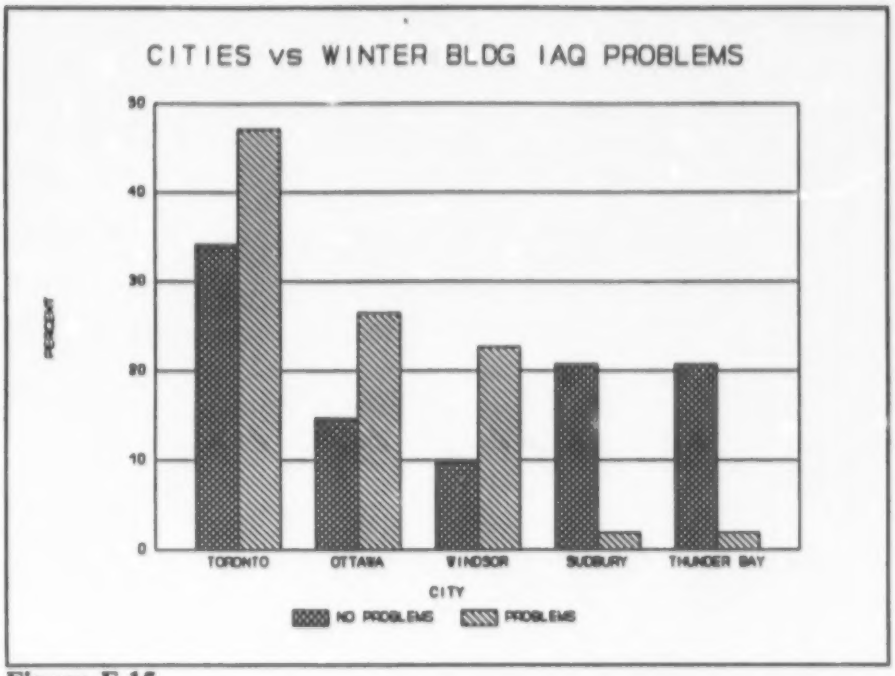

Figure E.15

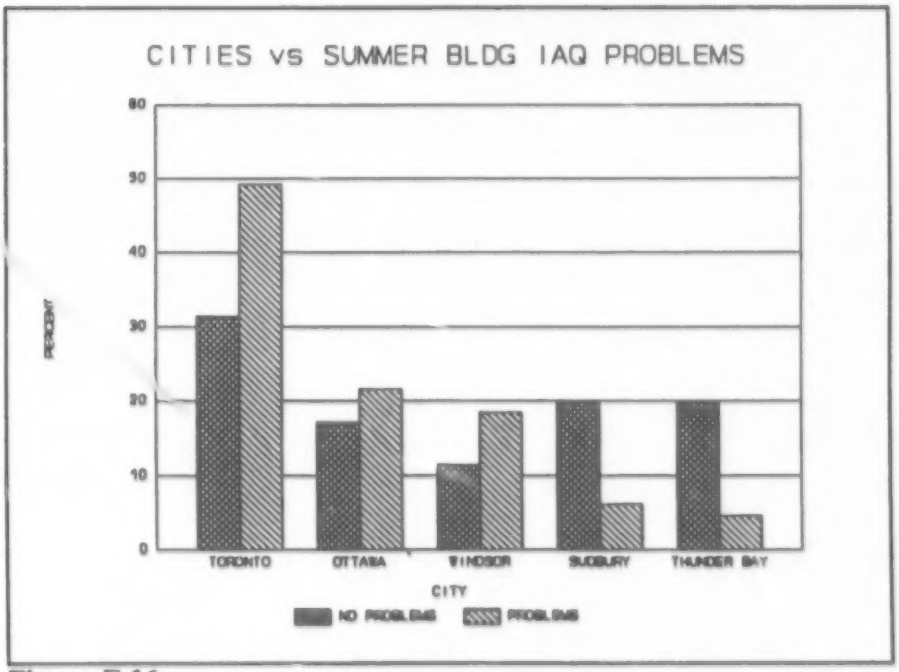

Figure E.16

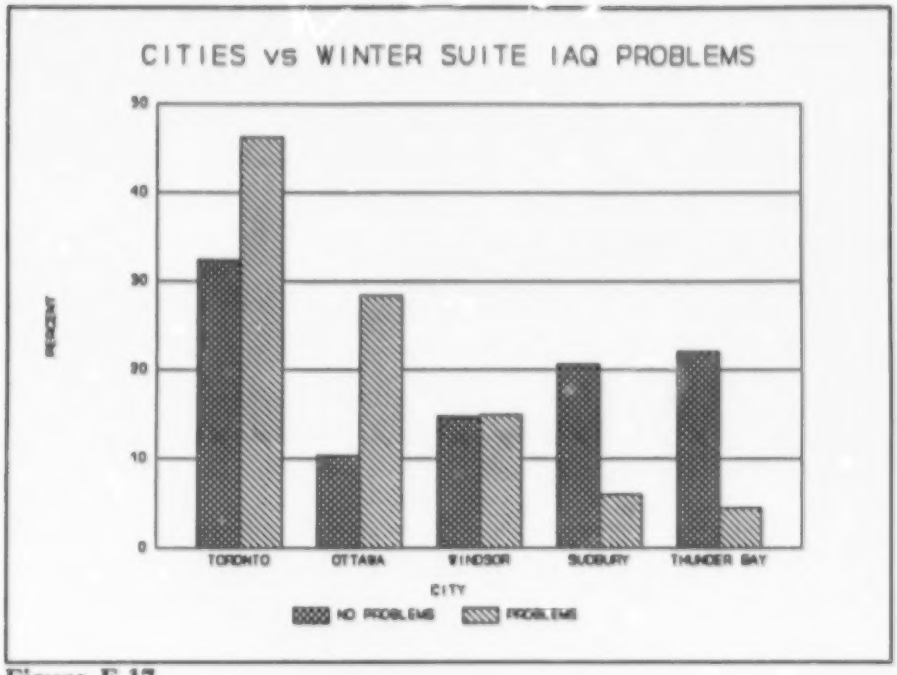

Figure E.17

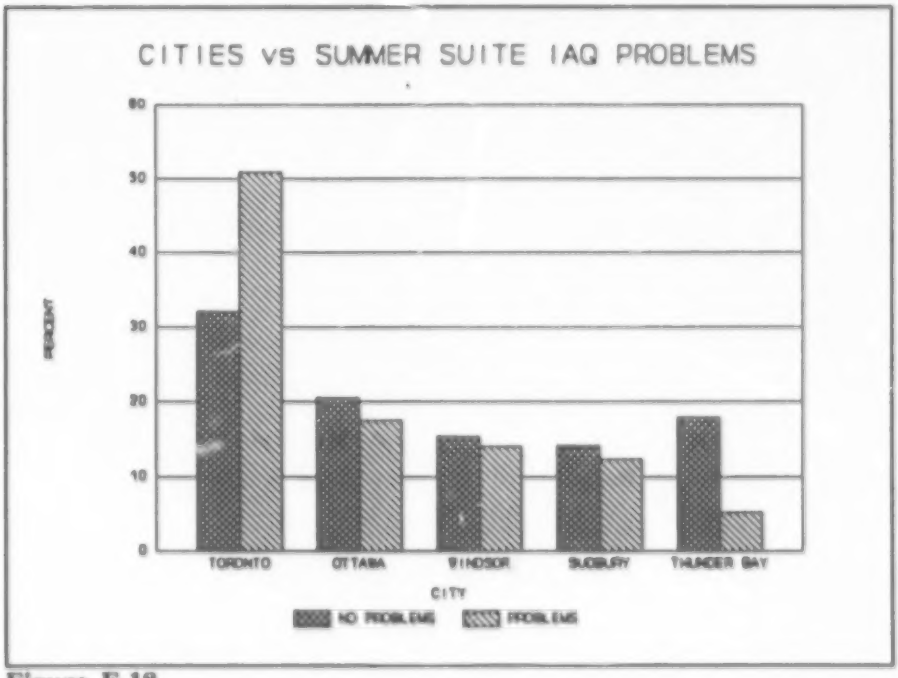

Figure E.18

APPENDIX F: Compiled Raw Data

- General Building Survey Raw Data
- Apartment Suite Survey Raw Data
- IAQ Test Raw Data

GENERAL BUILDING SURVEY FORM RAW DATA (Winter Survey)

Qn #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
																								B							
														S	W			+SEALS+				K	A			U		+PROXIMITY+		
														L	A							I	T			G				R
														A	L				S		T	M	T	H		R				I
B												A		B	L	WIN-		M	U		H	A	C	R		N				V
U												P				DOWS		A	I		E	K	H	O		D				E
I	S				F			←WIND→				T		C	C			I	T		R	E	E	O			L	I	H	R
L	U				O				S		S	S		O	O		G	N	E	H	M	|	N	M	G	L	P	O	N	I	S
D	R	D			R	T			P		T	/	#	N	N	F	L			E	O	U			A	A	A	C	D	G	/	P
I	V	A		O	E	E			E		O	F		S	S	R	A	D	D	A	S	P	E	E	R	U	R	A	U	H	L	E
N	E	T	C	H	C	M	R		E		R	L	A	T	T	A	Z	O	O	T	T		X	X	B	N	K	T	S	W	A	E
G	Y	E	I	C	A	P	H	D	D	A	E	O	P	R	R	M	I	O	O	I	A	A	H	H	A	D	I	I	T	A	K	D
	O		T		S			I		G	Y	O	T	C	C	E	N	R	R	N	T	I	S	S	G	R	N	O	R	Y	E	I
#	R	yymmdd	Y	#	T	C	%	R	m/	E	S	R	S	T	T	S	G	S	S	G	S	R	T	Y	E	Y	G	N	Y	S	S
1	1	890210	1	76	1	-8		4	7	20	12	20	239	1	1	1	2	0	0	2	3	2	1	1	2	2	1	2	0	2	0
2	1	890222	1	84	1	0	69	4	5	17	19	12	224	1	1	1	3	0	0	2	3	2	0	2	2	2	1	2	0	5	1
3	1	890227	1	88	1	0		1	7.	25	15	22	301	1	1	1	2	1	1	1	3	3	1	1	2	4	0	1	3	2	1
4	1	890221	1	168	3	4	78	1	4	14	7	9	57	1	1	1	3	1	1	3	1	4	3	3	2	3	1	1	0	3	3
5	1	890228	1	98	4	-1	58	3	7.	18	21	16	326	1	1	1	2	0	0	1	2	3	0	1	2	3	1	2	0	3	3
6	1	890308	2	9	1	-6	32	1	5	17	3	10	30	1	1	1	2	0	0	1	1	3	0	3	1	1	0	2	1	1	0
7	1	890310	2	18	1	3	40	1	7.	16	14	16	208	1	1	1	2	0	0	2	1	3	0	2	2	3	1	2	0	3	2
8	1	890309	2	50	2	-2	36	1	7.	14	14	16	216	1	3	1	2	1	0	3	1	3	3	3	2	3	0	1	2	0	2
9	1	890223	3	3	1	-8	66	1	20	23	8	17	135	1	1	1	2	1	0	4	1	0	0	1	2	1	0	2	4	0	4
10	1	890224	3	1	1	-8	60	1	5	24	6	22	132	1	1	1	2	0	0	4	1	0	0	1	2	1	0	2	4	0	4
11	2	890213	4	15	2	-5	66	3	31	17	12	14	162	1	1	1	2	0	0	1	1	3	3	1	2	5	1	2	0	1	0
12	2	890214	4	16	1	-8	47	4	15	17	11	10	101	1	1	1	2	0	1	1	1	3	3	1	2	3	1	2	0	1	0
13	2	890216	5	1	1	-28	68	4	27	17	2	2	24	2	1	1	2	1	0	3	1	0	3	3	3	2	0	2	3	0	3
14	2	890215	5	3	1	-13	33	4	20	15	3	10	29	2	1	2	2	0	1	3	1	3	3	3	3	3	0	2	3	2	3
15	2	890215	5	4	1	-15	40	4	20	17	7	9	60	2	1	1	2	1	0	3	1	3	3	1	2	3	0	2	2	0	3

(Summer Survey)

Qn #	1	2	3	4	5	6	7	8
B								
U								
I	S		L	F			←WIND→	
L	U		O	O				S
D	R	D	C	R	T			P
I	O	V	A	A	E	E		E
N	H	E	T	T	C	M	R	E
G	C	Y	E	I	A	P	H	D	D
		O		O	S			I	
#	#	R	yymmdd	N	T	C	%	R	km/h
1	76	1	890816	1	1	23	46	2	10
2	84	1	890829	1	2	22	61	4	3
3	88	1	890828	1	1	22	55	2	10
4	168	1	890816	1	1	19	66	3	0
5	98	1	890817	1	1	16	63	1	5
6	9	3	890822	2	1	23	37	4	5
7	18	3	890821	2	2	21	67	4	15
8	50	3	890822	2	1	17	58	4	10
9	3	1	890824	3	1	22	48	2	10
10	1	1	890824	3	1	22	48	4	10
11	15	2	890830	4	1	19	51	1	22
12	16	2	890830	4	1	24	33	1	25
13	1	2	890831	5	3	16	59	4	3
14	3	2	890831	5	3	16	58	2	12
15	4	2	890901	5	2	13	63	4	5

APARTMENT SUITE SURVEY FORM RAW DATA (Winter Survey)

On e	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
							←			OCCUPANCY		→		L				S				S		E	A		A				C		←	→	←		→										←	→		
														E				U			B	H		X	I	C	I				L		OPEN			APT SUITE				BUILDING							CO-		
														V				I		B		O		T	R	L	R				O	T	WIN-		I			D	I				D			OURS		C
B														E				T	K	A		W	H	R		E	F				H	E	DOWS		A	B		E	A	B			E		S			L
U							O							L		A		E	I	T	M	E	U	A	C	A	R				E	D			Q	O		S	Q	O			S		T			E
I							C									L	B	L			A	R	M		O	N	E				H	S	E			T		C		T			C	M	A		B	A
L			F	S			C		F	S		H	S	OF		L	E	O	E	E	L	S	I	H	N	I	S				A		C		P	H		R	P	H			R	O	T	K	A	N
D			L	U	T		U		E	E	A	I	M		P	EA	D	C	X	X	S	/	D	E	D	N	H	W			N	S	O	S	W	R	E		I	R	E			I	I	I	I	T	L
I		O	O	I	E		P	M	M	N	D	L	O	S	E	RS	R	A	H	H	/	B	I	A	I	G	E	A	D	G	O	R	U	I	O	R		P	O	R	W		P	S	C	T	H	I
N	C	H	O	T	M	R	A	A	A	A	I	U	D	K	M	T	GT	O	T	A	A	W	A	F	T	T	N	S	R	F	A	M	N	B	S	W	T	T	B	S	H	W	T	T	T	C	R	N
G	I	C	R	E	P	H	N	L	L	O	L	R	E	O	S	I	H	O	I	U	U	E	T	I	I	I	M	E	H	Y	D	T	T	M	T	L	O	H	I	I	L	O	E	H	I	I	U	A	H	O	E
	T						T	E	E	R	T	E	R	K		E	M	M	O	S	S	E	H	E	N	O	A	R	E	E	R	E	E	M	E	E	M	E	M	O	E	M	R	E	M	O	R	I	E	O	S
#	Y	#	#	#	C	%	S	S	S	S	S	N	S	E	#1	SA	S	N	T	T	K	S	R	G	N	T	S	R	R	Y	N	D	R	R	M	E	N	E	N	M	E	E	N	E	N	E	R	N	M	S
1	1	76	3	9	23.8	24	3	0	2	0	1	1	0	0	0	1	2	8	0	0	21	14	0	1	0	0	1	0	1	1	0	0	1	1	1	1	1	3	1	1	1	1	1	3	3	2	0	0	0	0
1	1	76	4	10	23	21	1	1	0	1	0	0	0	0	0	0	1	2	0	0	14	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	76	6	7	22	31	3	0	3	0	1	2	0	0	0	1	2	8	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	1	1	1	3	5	1	1	2	1	1	3	1	0	0	0	1
1	1	76	7	10	23	35	4	0	4	0	1	3	1	3	1	1	2	2	0	0	21	19	1	0	0	1	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1	1	76	8	9	22	38	3	0	3	0	1	2	0	0	0	0	2	2	0	0	21	21	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1	1	76	9	11	24	34	4	3	1	0	1	3	1	2	1	0	2	7	0	0	14	17	1	0	0	0	0	0	0	1	0	0	1	0	1	1	1	5	5	1	1	3	1	5	4	1	0	1	2	1
1	1	76	9	14	23	23	2	1	1	0	1	1	0	0	0	1	2	7	0	0	14	14	0	1	0	0	0	0	0	1	0	0	1	0	1	1	1	5	1	1	1	1	1	5	1	1	2	0	1	1
1	1	76	10	4	23	24	2	2	0	0	1	1	0	0	0	1	2	4	0	0	14	14	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	1	1	1	5	1	0	0	0	0	1
1	1	76	11	14	23	38	3	1	2	0	1	2	0	0	0	0	2	2	0	0	21	20	1	0	0	1	0	0	0		0	0	1	0	1	1	4	3	1	1	1	1	1	3	1	0	0	1	0	1
1	1																																																	
2	1	84	2	9	25.5	20	4	1	3	0	1	3	1	1	0	0	2	7	1	0	7	35	0	0	0	1	0	0	0	1	0	0	1	0	1	1	1	5	5	1	1	1	1	5	5	0	1	0	0	1
2	1	84	3	7	23.8	22	3	1	2	0	1	2	1	2	2	0	2	7	1	0	21	21	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
2	1	84	6	12	24.4	18	6	2	4	0	1	5	1	2	0	1	2	3	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	1	1	1	1	5	5	1	1	1	1	5	1	0	2	0	0	1
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2	1	84	14	1	26.1	29	4	3	1	0	1	3	0	0	0	1	2	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	1	5	9	0	0	0	0	0	0	2	2	0	1	1
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2	1	84	19	3	22.7	22	5	2	3	0	1	4	1	2	1	1	3	4	0	1	18	35	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	2	1	5	1	1	1	0	2
3	1	88	1	10	28.1	22	4	1	3	0	1	3	0	0	0	0	3	3	0	0	21	28	0	1	0	1	0	0	0	1	0	1	1	0	1	1	4	3	4	1	1	5	1	5	9	2	3	0	0	1
3	1	88	3	15	26	24	1	1	0	0	1	0	1	3	0	0	1	5	1	0	7	1	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
3	1	88	4	8	22.7	45	1	0	1	1	0	0	0	0	0	1	1	6	0	0	8	7	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	4	1	1	1	1	1	4	1	0	2	1	0	1
3	1	88	5	8	25.5	21	1	0	1	0	1	0	1	3	0	1	1	6	0	0	14	7	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	3	0	1	1	1	1	5	3	0	0	0	3
3	1	88	6	1	27.7	23	1	1	0	0	1	0	0	0	0	1	1	4	0	0	14	8	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3	1	88	7	16	28.6	20	1	0	1	1	0	0	1	1	0	0	1	2	0	1	9	4	1	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
3	1	88	8	21	28.6	23	1	0	1	1	0	0	1	1	0	0	1	4	0	1	10	7	0	0	0	0	1	0	0	0	0	0	1	1	1	0	0	5	5	0	0	0	0	0	0	0	0	0	0	1
3	1	88	9	19	25.5	40	1	0	1	1	0	0	0	0	5	0	1	4	1	1	21	7	1	1	0	0	0	0	0	0	1	0	0	1	1	1	1	1	3	1	0	0	0	0	0	0	0	0	0	1
3	1	88	10	2	23.3	20	1	1	0	0	1	0	1	2	0	0	1	6	0	1	10	4	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	5	3	0	0	0	0	0	0	1	3	0	1
3	1	88	11	8	23.8	27	1	0	1	1	0	0	1	3	0	1	1	6	1	0	14	7	1	1	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	1	1	1	1	3	1	0	0	0	1
3	1	88	12	20	25	21	1	1	0	1	0	0	0	0	2	0	1	2	0	0	14	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
3	1	88	14	4	25	23	3	2	1	1	2	0	0	0	2	1	2	6	1	0	14	21	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	5	5	1	1	1	1	5	1	2	2	1	0	3
3	1	88	15	11	25	33	3	2	1	1	0	1	2	1	3	5	0	2	5	0	0	21	21	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1
3	1	88	16	7	23.8	40	2	1	1	0	1	2	0	0	2	4	0	0	7	0	0	10	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	5	0	0	0	0	0	0	0	1	1	0	0	1
4	1	100	1	3	20.6	31	1	0	1	1	0	0	1	3	0	0	1	6	0	0	21	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
4	1	100	2	1	24.4	28	1	1	0	1	0	0	1	1	0	1	1	1	0	0	7	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3	5	5	0	0	0	0	0	0	3	0	0	1	
4	1	100	4	1	27.7	22	1	0	1	1	0	0	0	0	0	0	1	1	0	0	2	2	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	

APARTMENT SUITE SURVEY FORM RAW DATA (Winter Survey) - Continued

Case	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
							←						→					S									A				C		←		→			←				→				←			
								OCCUPANCY						L				U				S		E	A		I				L		OPEN		APT SUITE				BUILDING								CO-		
														E				I		B		H		X	I	C	R				O		WIN-													OURS		
							#							V				T	K	A		O		T	R	L					T	R	DOWS	I				D	I				D					C
B											#			E			#	E	I	T	M	W	H	R		E	F				H	E			A	B			E	A	B			E		S			L
U							O		#	#			#	L		A			T	H	E	E	U	A	C	A	R				E	D			Q	O			S	Q	O			S		T			E
I							C				#	C				L	B	L			A	R	M		O	N	E			H	S	E			T			C		T			C	M	A		B	A
L			F	S			C	#	F	S		H	S	OF		L	E	O	E	E	L	S	I	H	N	I	S			A		C			P	H			R	P	H			R	O	T	K	A	N
D			L	U	T		U		E	E	A	I	M		P	E	A	D	C	X	X	S	/	D	E	D	N	H	W		N	S	O	S	W	R	E			I	R	E			I	I	I	I	T	L
I		O	O	I	E		P	M	M	N	D	L	O	S	E	R	S	R	A	H	H	/	B	I	A	I	G	E	A	D	G	O	R	U	I	O	R			P	O	R	W		P	S	C	T	H	I
N	C	H	O	T	M	R	A	A	A	I	U	D	K	M	T	G	T	O	T	A	A	W	A	F	T	T		N	S	R		F	A	M	N	B	S	W	T	T	B	S	H	W	T	T	T		C	R	N
G	I	C	R	E	P	H	N	L	L	O	L	R	E	O	S	I	H	O	I	U	U	E	T	I	I	I	M	E	H	Y	D	T	T	M	T	L	O	H	I	I	L	O	E	H	I	I	U	A	H	O	E
	T						T	E	E	R	T	E	R	K		E	M	M	O	S	S	E	H	E	N	O	A	R	E	E	R	E	E	E	E	M	E	M	O	E	M	R	E	M	O	R	I	E	O	S
#	Y	#	#	#	C	%	S	S	S	S	S	N	S	E	#1	S	A	S	N	T	T	K	S	R	G	N	T	S	R	R	Y	N	D	R	R	M	E	E	N	E	M	E	N	E	R	N	M	S
4	1	100	5	4	24.4	34	2	1	1	2	0	0	2	3	0	0	1	4	0	0	8	8	0	0	0	0	0	0	0	1	0	0	1	1	1	1	3	6	5	0	0	0	0	0	0	0	3	0	0	1
4	1	100	6	7	23.8	34	1	0	1	1	0	0	0	0	0	1	1	6	0	0	4	7	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4	1	100	7	7	23.3	34	1	0	1	1	0	0	0	0	0	0	1	6	0	0	21	2	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1
5	1	99	1	4	20.5	30	2	0	1	0	1	1	1	1	0	0	1	6	0	0	4	14	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
5	1	99	3	16	21.6	19	1	0	1	1	0	0	1	1	0	0	1	3	0	0	14	7	0	0	0	0	1	0	0	1	0	0	1	0	1	1	1	5	9	1	1	1	1	1	5	10	1	1	0	0	1
5	1	99	5	4	21.1	27	2	1	0	1	1	0	1	2	0	1	2	4	0	0	14	14	1	0	0	0	1	0	0	0	0	0	1	0	1	1	1	5	1	1	1	1	1	1	5	1	1	3	0	0	1
5	1	99	6	6	25	17	1	0	1	1	0	0	1	1	0	0	1	6	0	0	10	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1
5	1	99	7	17	23.8	16	1	0	1	1	0	0	0	0	0	1	1	3	0	0	15	3	0	0	1	1	0	0	0	0	0	0	0	0	1	1	3	5	5	1	1	5	3	5	5	0	3	0	0	2
5	1	99	9	8	23.3	17	1	0	1	1	0	0	0	0	0	0	1	7	0	0	7	7	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	3	1	0	1	0	0	1
5	1	99	11	5	25	23	3	0	3	0	1	2	0	0	3	1	2	6	0	0	14	21	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1	3	9	1	1	5	1	5	9	0	3	0	0	1
5	1	99	12	9	23.8	19	1	0	1	1	0	0	0	0	0	0	1	7	0	0	14	7	0	0	0	0	0	0	0	1	1	1	0	1	0	1	1	3	5	5	0	0	0	0	0	0	1	2	0	0	1
5	1	99	14	14	22.2	21	2	1	1	2	0	0	2	3	5	0	2	2	0	0	7	8	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	3
5	1	99	16	10	23.3	14	2	1	1	2	0	0	1	2	0	1	1	7	0	0	10	14	0	0	1	0	0	0	0	0	0	0	1	0	1	1	1	5	5	1	1	5	1	5	5	1	3	0	0	1
5	1	99	18	17	22.7	16	1	0	1	1	0	0	0	0	0	1	1	3	0	1	14	7	0	0	1	0	0	0	0	1	0	0	0	1	1	1	1	4	1	1	1	5	1	4	1	1	3	1	0	1
5	1	99	19	2	25.5	31	1	1	0	1	0	0	1	1	0	0	1	3	0	0	21	5	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1
5	1	99	20	12	24.4	15	2	0	2	1	1	0	2	2	1	1	2	1	0	0	21	14	1	0	0	0	0	0	0	0	0	0	1	0	1	1	1	5	1	0	0	0	0	0	0	1	1	0	0	2
5	1	99	22	3	24.4	14	3	1	2	2	1	0	1	1	0	0	2	4	0	0	13	3	0	1	0	0	0	0	0	0	0	0	1	1	1	1	3	4	1	1	1	1	1	1	5	9	1	2	0	1	2
6	2	9	1	2	23.3	24	3	0	3	0	2	1	2	3	0	1	2	3	0	0	24	21	1	1	0	0	1	0	0	0	0	0	1	0	1	1	1	3	5	5	0	0	0	0	0	0	1	2	0	0	1
6	2	9	1	6	25	27	2	0	2	0	2	0	0	0	0	0	2	5	1	0	21	8	0	0	0	0	1	0	0	0	0	0	1	0	1	1	1	3	5	5	0	0	0	0	0	0	1	2	0	0	1
6	2	9	2	1	23.3	23	2	0	1	0	1	1	1	2	0	0	2	6	1	0	21	14	0	1	1	0	1	0	0	1	0	0	1	0	1	1	1	3	3	5	1	1	5	1	5	9	2	3	3	0	1
6	2	9	2	9	24.4	24	2	1	1	0	2	0	2	4	0	0	2	2	1	0	14	10	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	4	1	2	2	0	0	1
6	2	9	3	10	23.8	33	2	1	1	0	1	1	1	2	3	0	2	4	1	0	21	10	1	0	0	0	0	0	0	0	0	0	1	1	1	0	1	5	5	1	1	5	1	4	1	0	3	0	0	1
6	2	9	3	3	23.8	27	2	1	1	0	1	1	1	2	0	0	2	6	1	0	19	14	0	0	0	1	0	0	0	1	0	0	1	0	1	1	1	5	1	1	1	1	1	1	5	9	3	2	0	0	1
7	2	18	2	4	23.8	23	2	1	1	0	2	0	1	3	0	0	2	6	1	0	21	45	1	1	2	1	1	2	2	2	2	2	1	1	1	0	3	3	5	1	1	5	1	4	5	1	2	0	0	3
7	2	18	3	14	20.5	21	4	1	3	0	3	1	1	1	0	0	2	1	1	0	21	20	0	1	0	0	1	0	0	1	0	1	1	1	1	1	1	4	5	1	1	1	1	5	1	1	2	0	0	1
7	2	18	5	2	22.2	19	2	1	1	0	2	0	2	3	2	1	2	6	1	0	15	14	0	0	1	0	1	0	0	0	0	0	1	1	1	1	1	5	5	1	1	1	1	1	5	9	2	3	2	0	1
7	2	18	6	3	24.4	25	3	0	3	0	1	2	0	0	3	1	2	6	1	0	21	21	1	0	0	0	1	1	0	1	0	0	1	1	1	1	1	5	5	1	1	5	1	1	5	10	1	2	0	0	1
7	2	18	8	9	23.8	18	3	1	2	0	2	1	0	0	1	0	2	4	1	0	21	21	1	0	0	1	1	1	1	0	0	0	1	1	1	1	1	3	3	5	1	1	5	1	3	8	2	0	0	0	3
7	2	18	9	11	24.4	13	2	0	2	0	1	1	1	3	2	0	2	4	1	0	14	14	1	0	0	0	1	0	0	0	0	0	1	1	1	1	1	5	5	0	0	0	0	0	0	1	1	0	0	2
7	2	18	11	7	22.7	23	3	1	2	0	1	2	1	1	0	0	2	6	1	0	21	21	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	1	1	1	5	9	1	2	0	0	1
7	2	18	12	8	25.5	17	3	2	1	1	1	1	2	2	0	0	2	5	1	0	14	18	0	0	1	0	1	0	0	0	0	0	1	0	1	1	1	3	3	1	1	1	1	1	5	9	0	0	1	0	3
7	2	18	14	5	25.5	14	2	1	1	0	1	1	1	1	2	1	2	6	1	0	21	14	1	0	1	0	1	0	0	0	0	0	1	1	1	1	1	5	5	0	0	0	0	0	0	1	1	0	0	2
7	2	18	15	15	25.5	14	1	0	1	0	1	0	0	0	1	1	2	2	1	0	21	7	0	0	0	0	1	0	0	1	0	1	1	1	1	1	1	5	5	1	1	5	1	5	5	0	3	0	0	1
8	2	50	1	3	24.4	20	1	1	0	1	0	0	1	1	0	0	1	2	0	0	7	7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8	2	50	2	16	23.3	19	1	1	0	1	0	0	1	2	0	0	1	7	0	0	21	4	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	1	0	1	1	4	1	0	0	0	0	1
8	2	50	4	11	22.7	18	1	0	1	0	1	0	1	2	0	0	1	4	0	0	14	7	0	0	1	0	1	0	0	0	0	0	1	1	1	1	1	5	5	0	0	0	0	0	0	2	0	0	0	1
8	2	50	5	6	26.1	14	1	0	1	0	1	0	1	1	0	0	1	2	0	0	21	3	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

APARTMENT SUITE SURVEY FORM RAW DATA (Winter Survey) - Continued

On #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
							← OCCUPANCY →							L				S				S		E	A		A				C		OPEN		APT SUITE				BUILDING						OC-			
														E				U			B	H		X	I	C	I				L	←	→	←											OURS			
														V				I				O		T	R	L					O		WIN-															
							#							E			#	T	K	A		O		T	R	L					T	R	DOWS	I				D	I				D				C
B											#						#	E	I	T	M	W	H	R		E	F				H	E		A	B			E	A	B			E		S		L
U							O		#	#			#	L				A		T	H	E	E	U	A	C	A	R			E	D		Q	O			S	Q	O			S		T		E
I							C				#	C						L				A	R	M		O	N	E			H	S	E		T			C		T			C	M	A		B	A
L			F	S			C	#	F	S		H	S	OF				L	E	O	E	E	L	S	I	H	N	I	S		A		C		P	H			R	P	H			R	O	T	K	A	N
D			L	U	T		U		E	E	A	I	M		P	E	A	D	C	X	X	S	/	D	E	D	N	H	W		N	S	O	S	W	R	E			I	R	E			I	I	I	I	T	L
I		O	O	I	E		P	M	M	N	D	L	O	S	E	R	S	R	A	H	H	/	B	I	A	I	G	E	A	D	G	O	R	U	I	O	R			P	O	R	W			P	S	C	T	H	I
N	C	H	O	T	M	R	A	A	A	I	U	D	K	M	T	G	T	O	T	A	A	W	A	F	T	T		N	S	R		F	A	M	N	B	S	W	T	T	B	S	H	W	T	T	T		C	R	N
G	I	C	R	E	P	H	N	L	L	O	L	R	E	O	S	I	H	O	I	U	U	E	T	I	I	I	M	E	H	Y	D	T	T	@	T	L	O	H	I	I	L	O	E	H	I	I	U	A	H	O	E
	T						T	E	E	R	T	E	R	K		E	M	M	O	S	S	E	H	E	N	O	A	R	E	E	R	E	E	E	E	M	E	M	O	E	M	R	E	M	O	R	I	E	O	S
#	Y	#	#	#	C	%	S	S	S	S	S	N	S	E	#1	S	A	S	N	T	T	K	S	R	G	N	T	S	R	I	Y	N	D	R	R	M	E	N	E	N	E	N	M	E	E	N	E	R	N	M	S
8	2	50	7	1	24.4	23	1	0	1	1	0	0	0	0	0	0	1	8	0	0	21	4	1	0	0	0	1	0	0	0	0	0	1	1	1	1	3	5	5	0	0	0	0	0	0	0	0	0	0	1
8	2	50	8	11	23.3	14	1	0	1	0	1	0	1	1	0	0	1	4	0	0	21	4	0	0	0	0	0	0	0	0	0	0	1	1	1	1	3	5	5	0	0	0	0	0	0	0	3	0	0	1
8	2	50	9	15	22.2	12	1	1	0	0	1	0	1	1	0	0	1	8	0	0	14	4	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8	2	50	10	15	22.2	12	1	1	0	0	1	0	1	1	0	0	1	8	0	0	14	4	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8	2	50	11	4	24.4	11	1	0	1	1	0	0	0	0	0	0	1	8	0	0	7	7	0	1	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8	2	50	14	1	25.5	11	2	1	1	0	2	0	1	3	0	1	1	8	0	0	14	14	0	0	0	0	1	0	0	0	0	0	1	1	1	1	3	3	5	1	0	1	1	5	7	1	2	1	1	1
8	2	50	15	9	22.7	9	1	0	1	1	0	0	0	0	0	0	1	2	0	0	18	7	0	0	0	0	0	0	0	1	0	0	1	1	1	1	3	3	5	0	0	0	0	0	0	0	1	0	0	1
9	3	3	1	1	23.3	14	1	1	0	1	0	0	0	0	0	0	1	3	1	0	7	3	0	0	0	1	0	0	0	0	0	0	1	0	1	1	1	1	5	0	0	0	0	0	0	0	0	0	0	1
9	3	3	1	17	25.8	20	1	1	0	1	0	0	0	0	0	1	1	2	1	0	14	3	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
9	3	3	2	12	24.4	16	1	0	1	1	0	0	1	2	0	0	1	8	1	0	14	4	0	0	1	0	1	0	0	0	0	0	1	0	1	1	1	1	5	4	1	1	1	1	4	4	0	1	0	1
9	3	3	3	8	22.7	15	1	0	1	1	0	0	1	2	0	0	1	7	1	0	7	7	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	10	0	1	0	0	1
9	3	3	4	1	22.7	15	1	0	1	1	0	0	0	0	0	0	1	2	1	0	10	2	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9	3	3	5	11	23.8	18	1	1	0	1	0	0	1	1	0	0	1	2	1	0	7	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	1
9	3	3	6	6	24.4	21	1	1	0	1	0	0	0	0	3	0	1	4	1	0	3	3	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	3	3	9	1	0	1	1	3	1	0	0	0	1
9	3	3	8	13	22	15	1	1	0	1	0	0	0	0	0	1	1	2	1	0	21	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	3
9	3	3	7	16	23.8	21	1	1	0	1	0	0	1	3	0	0	1	1	0	2	1	0	0	1	0	1	0	0	0	0	0	0	0	0	1	3	·	5	7	1	0	1	1	5	1	0	1	0	1	1
9	3	3	8	11	23.8	21	1	1	0	1	0	0	0	0	0	1	1	3	1	0	0	7	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	1	2	1	5	4	0	0	0	0	1
10	3	1	1	8	26.8	18	1	1	0	0	1	0	0	0	2	0	1	7	0	0	14	7	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	4	1	1	0	0	1
10	3	1	1	13	23.3	28	1	0	1	1	0	0	0	0	0	1	1	5	0	0	14	3	1	0	0	0	1	0	0	1	1	0	1	1	0	1	1	1	4	1	1	1	1	1	4	1	0	1	0	1
10	3	1	2	6	22.7	20	1	0	1	1	0	0	0	0	0	0	1	8	0	0	7	7	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	1	1	1	1	1	4	1	1	0	0	1
10	3	1	3	7	24.4	25	2	1	1	2	0	0	2	4	0	1	1	2	0	0	14	7	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	4	1	1	1	1	1	4	1	1	2	0	1
10	3	1	4	18	25.5	23	3	2	1	0	1	2	1	1	0	1	2	1	1	0	21	21	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
10	3	1	4	2	22.7	26	2	1	1	0	2	0	0	0	0	1	1	1	0	0	14	11	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
10	3	1	5	9	24.4	49	1	0	1	0	1	0	0	0	0	0	1	5	1	0	16	7	0	0	0	0	1	0	0	0	0	0	1	0	1	1	3	3	5	0	0	0	0	0	0	0	0	0	0	1
10	3	1	5	18	22	26	2	1	1	0	1	1	1	2	4	0	2	3	1	0	12	11	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	1	1	1	1	1	4	1	0	3	0	0
10	3	1	6	21	21.1	20	2	1	1	0	1	1	0	0	0	1	2	7	1	0	7	14	1	0	1	0	0	0	0	0	0	0	1	0	1	1	1	5	7	1	0	5	1	5	1	0	1	0	0	1
10	3	1	6	2	24.4	22	1	0	1	0	1	0	0	0	2	1	1	7	1	0	7	8	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1
11	4	15	3	7	25.8	25	4	2	2	0	2	2	1	1	0	0	3	8	1	1	21	28	0	0	0	1	1	0	0	0	1	0	1	1	1	1	1	1	8	8	0	0	0	0	0	0	2	1	1	2
11	4	15	4	10	22	21	2	1	1	0	2	0	0	0	1	0	2	1	1	1	21	10	0	0	0	1	1	0	0	0	1	0	1	1	0	0	0	0	0	1	1	1	1	1	3	1	0	0	0	1
11	4	15	5	5	22	28	2	1	1	0	2	0	2	3	1	1	2	8	1	1	21	14	1	0	0	1	1	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11	4	15	6	12	23.3	20	1	1	0	0	1	0	1	3	2	1	2	2	1	0	21	7	0	0	1	1	1	0	0	1	1	1	1	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11	4	15	7	1	22.7	21	1	0	1	0	1	0	0	0	1	0	2	5	1	1	21	7	1	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11	4	15	8	2	22	30	2	1	1	2	0	0	1	2	0	0	2	5	1	0	21	6	0	0	0	0	1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1
11	4	15	9	10	22	20	4	2	2	0	2	2	2	4	0	1	2	8	1	0	21	28	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11	4	15	10	14	21.8	25	2	1	1	1	0	0	0	0	0	2	4	1	0	0	16	6	0	0	0	0	1	0	0	0	0	0	1	0	1	0	1	1	1	1	1	1	1	5	10	0	0	0	0	1
11	4	15	11	7	20.5	25	3	0	3	0	1	2	1	3	0	0	2	8	1	0	21	21	1	0	0	1	0	0	0	0	0	0	1	1	1	1	1	1	5	4	0	0	0	0	0	0	1	3	0	0
11	4	15	12	6	21.1	18	2	2	0	0	1	1	2	3	0	0	2	8	1	0	20	7	0	0	0	1	0	0	0	0	1	0	0	1	0	1	1	1	4	3	4	0	0	0	0	0	0	0	2	1
12	4	16	3	7	21	18	1	1	0	1	0	0	0	0	0	0	1	8	0	0	21	8	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2

APARTMENT SUITE SURVEY FORM RAW DATA (Winter Survey) - Continued

Qn #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
							← OCCUPANCY →							L				S									A				C		← OPEN	→	← APT SUITE →				← BUILDING →								← OD-	→	
														E				U				H		E	A		I				L		WIN-														OURS		
														V				I		B		X	I	C	R						O		DOWS		I				D	I			D					C
B							#					#		E			#	E	I	T	M	W	H	R		E	F				H	E			A	B			E	A	B		E		S			L
U							O		#	#			#	L		A			T	H	E	E	U	A	C	A	R				E	D			Q	O			S	Q	O		S		T			E
I							C				#	C				L	B	L			A	R	M		O	N	E			H	S	E			T			C		T		C	M	A		B	A
L			F	S			C	#	F	S		H	S	OF		L	E	O	E	E	L	S	I	H	N	I	S			A		C			P	H			R	P	H		R	O	T	K	A	N
D			L	U	T		U		E	E	A	I	M		P	EA	D	C	X	X	S	/	D	E	D	N	H	W		N	S	O	S	W	R	E			I	R	E		I	I	I	I	T	L
I		O	O	I	E		P	M	M	N	D	L	O	S	E	RS	R	A	H	H	/	B	I	A	I	G	E	A	D	G	O	R	U	I	O	R			P	O	R	W		P	S	C	T	H	I
N	C	H	O	T	M	R	A	A	A	I	U	D	K	M	T	GT	O	T	A	A	W	A	F	T	T		N	S	R		F	A	M	N	B	S	W	T	T	B	S	H	W	T	T	T		C	R	N
G	I	C	R	E	P	H	N	L	L	O	L	R	E	O	S	IH	O	I	U	U	E	T	I	I	I	M	E	H	Y	D	T	T	M	T	L	O	H	I	I	L	O	E	H	I	I	U	A	H	O	E
	T						T	E	E	R	T	E	R	K		EM	M	O	S	S	E	H	E	N	O	A	R	E	E	R	E	E	E	E	E	M	E	M	O	E	M	R	E	M	O	R	I	E	O	S
#	Y	#	#	#	C	%	S	S	S	S	S	N	S	E	#1	SA	S	N	T	T	K	S	R	G	N	T	S	R	R	Y	N	D	R	R	M	E	W	E	N	E	N	E	R	R	N	M	S
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12	4	16	5	9	27	24	1	0	1	0	1	0	0	0	0	0	1	1	0	0	21	4	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2
12	4	16	6	7	23.3	25	1	1	0	1	0	0	0	0	0	0	1	8	0	0	18	2	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12	4	16	7	1	22	25	1	1	0	1	0	0	0	0	0	0	1	6	0	0	10	3	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	1
12	4	16	8	8	23.8	29	1	1	0	1	0	0	1	2	0	1	1	8	0	0	21	4	1	0	0	1	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12	4	16	9	4	24	28	1	0	1	1	0	0	0	0	0	0	1	5	0	0	21	2	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12	4	16	10	10	22	33	1	0	1	1	0	0	1	2	0	0	1	1	0	0	21	3	1	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0
12	4	16	11	7	22	25	1	0	1	1	0	0	1	2	0	0	1	8	0	0	21	4	1	0	0	1	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
13	5	1	3	3	21	30	2	0	2	0	1	1	0	0	0	0	2	7	1	0	17	10	0	0	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	1
13	5	1	1	4	21	31	2	0	2	0	1	1	0	0	0	0	2	3	1	0	17	11	0	0	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
13	5	1	1	2	20.5	44	3	1	1	0	2	1	1	2	1	0	2	3	0	0	14	8	0	0	1	1	0	0	0	0	0	1	0	1	1	4	3	1	0	0	0	0	0	0	0	1	1	2
13	5	1	5	3	21	23	2	1	1	0	1	1	0	0	3	1	2	7	0	0	14	6	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
13	5	1	6	1	18.3	32	2	0	2	0	1	1	0	0	0	0	2	7	0	0	10	14	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	4	4	5	6	0	1	0	0	2
13	5	1	6	2	22	21	3	2	1	0	2	1	3	2	1	0	2	7	0	0	21	21	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
14	5	3	1	8	17.2	32	3	2	1	0	2	1	0	0	0	0	2	7	0	0	18	12	0	0	0	1	0	0	0	0	1	0	1	0	1	1	1	4	0	0	0	0	0	0	0	0	1	0	3
14	5	3	1	1	16.8	22	3	2	1	0	2	1	2	3	0	0	2	2	1	1	2	40	1	0	0	1	0	0	0	0	1	0	1	1	0	0	0	6	0	0	0	0	0	0	0	2	2	0	0	2
14	5	3	3	6	22	48	2	1	1	0	1	1	0	0	0	0	2	6	1	1	14	14	1	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1
14	5	3	2	9	20.5	31	2	1	1	0	1	1	1	3	0	0	2	6	1	0	16	14	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
14	5	3	3	6	20	32	2	1	1	0	1	1	1	3	3	1	2	6	1	1	21	8	0	0	0	1	0	0	0	0	0	0	1	0	1	1	1	5	3	0	0	0	0	0	0	2	0	1	1	3
14	5	3	3	1	20	22	2	0	2	0	1	1	1	1	0	0	2	2	1	0	21	14	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
15	5	4	2	2	20	17	1	1	0	1	0	0	0	0	0	0	1	5	1	1	18	4	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
15	5	4	3	9	19	15	1	1	0	1	0	0	0	0	0	1	1	8	0	0	9	5	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
15	5	4	4	7	21	18	1	0	1	0	1	0	1	2	0	0	1	6	0	0	10	2	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
15	5	4	5	9	18.3	20	1	0	1	1	0	0	0	0	0	0	1	6	1	1	7	1	0	0	1	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
15	5	4	6	1	20	23	1	1	0	1	0	0	0	0	0	1	1	3	1	1	21	6	0	0	1	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	1
15	5	4	6	8	18.5	21	1	1	0	1	0	0	0	0	0	0	1	3	0	0	14	4	1	0	0	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	1

APARTMENT SUITE SURVEY FORM RAW DATA (Summer Survey)

Qn #	1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	49A	50	51	52	53	54	56
									I			←			OCCUPANCY			→	L				U			S					A				C									S							S					←	→
									N										E				I		B		H		X	I	C	R			O		OPEN		APT SUITE			U		BUILDING				U			OD-	
									T			#							V				T	K	A		O		T	R	L				T	R	WIN-					M						M			OURS	
B									E								#		E			#	E	I	T	M	W	H	R		E	F			H	E	DOWS	I			D	M	I				D	M			C
U									R			O		#	#			#	L	A				T	H	E	E	U	A	C	A	R				E	D		Q	O		S	R	Q	O			S	R		T			L
I	S								V			C				#	C			L	B	L				A	R	M		O	N	E			H	S	E			T		C		T			C		M	A		B	A
L	U						F	S	I			C	#	F	S		H	S	OF	L	E	O	E	E	L	S	I	H	N	I	S			A		C		P	H		R	R	P	H			R	R	O	T	K	A	N
D	R	D	T			L	U	E	T			U		E	E	A	I	M		P	E	A	D	C	X	X	S	/	D	E	D	N	H	W		N	S	O	S	W	R	E			I	A	R	E			I	A	I	I	T	L
I	V	A	I		O	O	I	W	E			P	M	M	N	D	L	O	S	E	R	S	R	A	H	H	/	B	I	A	I	G	E	A	D	G	O	R	U	I	O	R			P	N	O	R	W		P	N	S	C	T	H	I
N	E	T	M	C	H	O	T	E	M	R		A	A	A	I	U	D	K	M	T	G	T	O	T	A	A	W	A	F	T	T		N	S	R		F	A	M	N	B	S	W	T	T	K	B	S	H	W	T	T	K	T		C	R	N
G	Y	E	E	I	C	R	E	D	P	H		N	L	L	O	L	R	E	O	S	I	H	O	I	U	U	E	T	I	I	I	M	E	H	Y	D	T	T	M	T	L	O	H	I	I	I	I	L	O	E	H	I	I	I	U	A	H	O	E
	O			T								T	E	E	R	T	E	R	K		E	M	M	O	S	S	E	H	E	N	O	A	R	E	E	R	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
#	R	YMMD	HHMM	Y	#	#	#	?	C	%		S	S	S	S	S	S	N	S	E	#	SA	S	N	T	T	K	S	R	G	N	T	S	R	R	Y	N	D	R	R	M	E	N	E	N	E	N	G	M	E	E	N	E	R	N	M	S
1	1	880816	1229	1	76	3	9	1	28	39		2	0	2	0	1	1	0	0	0	0	0	2		1	1	8	7	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	1	1	5	1	5	11	3	1	0	3	3	0
1	1	880816	1230	1	76	4	19	1	27	32		1	1	0	1	0	0	0	0	0	0	1		1	0	5	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	2	5	6	2	1	1	2	1		3	1	3	0	0	0	2
1	1	880816		1	76	6	7	0	25	36		3	1	1	0	2	1	0	0	0	0	0	2		0	0	14	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	6	2		9	3	0	0	0	0	0
1	1	880816	1316	1	76	7	16	1	28	41		4	0	1	0	0	3	1	2	6	1	2		0	1	14	15	0	0	1	0	1	1	1	0	1	0	1	0	1	0	2	2	6	1	0	0	0	0	0	0	2	0	0	0	1
1	1	880816	1445	1	76	9	3	0	27	41		1	1	0	0	1	0	1	3	0	1	1		1	1	21	3	1	1	0	0	0	1	1	1	1	0	1	0	1	1	1	5	8	2	1	1	7	1		3	3	2	2	3	3	2
1	1	880816	1420	1	76	9	20	0	27	34		1	1	0	0	1	0	0	0	0	0	1	2		0	0	1	20	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1	1	880816	1341	1	76	10	4	1	27	32		2	2	0	0	1	1	0	0	0	1	2		0	0	14	14	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1	1	880816	1414	1	76	11	10	0	25	39		3	1	2	0	2	1	2	0	0	0	2		0	0	21		1	0	0	0	1	0	0	0	0	0	1	1	1	1	3	3	5	3	1	1	8	1	5	8	3	3	3	0	3	1
1	1	880816	1345	1	76	11	14	1	25	33		4	1	3	0	1	3	0	0	0	0	2		1	1	21	10	0	0	0	0	1	0	0	1	0	0	1	0	1	0	2	2	6	1	1	0	1	2	2	11	1	1	0	0	0	0
1	1	880816	1356	1	76	12	10	0	25	30		2	0	2	0	1	0	0	0	0	1	2		1	1	21	8	0	0	1	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	1	1	2		9	2	0	0	0	0	1
2	1	880829	910	1	84	2	11	0	25	57		2	1	1	0	1	1	0	0	0	0	2		0	0	14	14	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	1	1	2	3	8	3	2	2	0	0	1
2	1	880829	925	1	84	3	5	0	26	47		3	1	2	0	1	2	1	1	0	0	2		0	1	14	21	0	0	1	0	1	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
2	1	880829	940	1	84	6	12	1	27	45		2	1	1	0	1	1	1	2	0	1	2		0	0	14	14	1	1	0	1	1	0	0	0	0	0	1	0	1	1	2	3	6	3	1	1	1	3	3	1	2	3	2	0	0	1
2	1	880829	945	1	84	8	12	0	27	45		3	1	2	0	1	2	0	0	0	0	2		0	0	14	21	0	0	0	0	1	0	0	1	0	1	1	0	1	0	2	5	5	1	0	0	0	0	0	0	0	3	1	0	0	1
2	1	880829	960	1	84	10	12	1	27	44		2	1	1	0	1	1	0	0	0	0	2		0	0	5	21	0	0	0	0	1	0	0	0	0	1	1	0	1	1	2	1	5	1	0	0	0	0	0	0	0	3	1	0	0	0
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2	1	880829	1015	1	84	14	8	0	26	45		3	1	2	0	2	1	1	3	6	0	2		0	1	14	14	0	0	0	0	0	0	0	0	1	0	1	0	1	0	4	5	11	1	1	1	5	1	5	11	3	0	0	0	0	3
2	1	880829	1025	1	84	15	8	0	27	43		2	0	2	0	1	1	1	1	0	0	2		0	0	14	14	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
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2	1	880829	1056	1	84	19	3	1	28	48		5	2	3	0	1	4	1	2	6	0	3		0	1	14	35	0	0	1	0	1	0	0	0	0	0	0	1	1	1	3	1	11	2	1	1	2	2	5	9	3	1	3	0	0	1
3	1	880828	907	1	88	1	10	1	22			4	1	3	0	1	3	0	0	0	0	3		0	1	7	14	0	1	0	1	0	0	0	1	0	0	1	0	1	1	1	3	5	5	1	1	1	6	2		9	2	0	1	0	0	2
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3	1	880828	1010	1	88	7	16	1	25	51		1	0	1	0	1	0	1	1	0	1	1		1	1	7	4	1	0	0	0	1	0	0	1	0	0	0	1	0	1	1	2	5	6	2	0	0	0	0	0	0	0	2	0	1	0	2
3	1	880828	1020	1	88	8	21	1	25	44		1	0	1	1	0	0	1	1	0	0	1		0	1	10	30	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	1	0	1	4	5	1	0	0	0	0	1
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3	1	880828	1040	1	88	10	2	1	25	47		1	1	0	0	1	0	1	2	0	0	0		1	0	2	7	0	0	0	0	0	0	0	1	0	0	1	0	1	1	3	5	5	3	1	1	6	3	5	3	2	3	0	0	0	2
3	1	880828	1050	1	88	11	3	0	25	46		3	1	2	0	2	1	2	3	2	1	1		0	0	4	20	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	3	1	5	3	1	1	6	1		3	2	0	0	0	0	2
3	1	880828	1105	1	88	12	20	1	24	48		1	1	0	1	0	0	0	0	0	0	1		0	0	14	4	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	880828	1120	1	88	14	5	0	23	50		1	1	0	1	0	0	1	2	0	1	1		1	1	7	7	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	6	1	5	3	3	0	0	0	1
3	1	880828	1130	1	88	15	9	0	28	48		1	1	0	1	0	0	1	3	0	1	0		1	0	7	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	6	2	5	3	1	2	0	0	2
3	1	880828	1140	1	88	16	7	1	25	46		2	1	1	1	1	0	1	2	0	0	2		1	0	7	11	0	0	1	0	1	0	0	0	0	0	1	1	1	1	1	3	1	5	1	1	1	6	1	3	3	3	2	2	0	0	1
4	1	880816	824	1	100	1	3	1	23	40	1	0	1	1	0	0	1	3	0	0	1	6	0	0	0	7	4	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
4	1	880816	840	1	100	2	1	1	24	47		1	1	0	1	0	0	1	1	0	1	0	0	0	0	14	3	0	0	1	0	0	0	0	0	0	0	1	1	1	1	1	3	11	1	0	0	0	0	0	1	1	1	3	3	11	1	1	0	0	1
4	1	880816	933	1	100	4	1	1	25	48		1	0	1	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	1	0	0	1	0	1	1	1	0	0	0	0	0	0	1	1	1	3	3	11	1	1	0	0	0	1

APARTMENT SUITE SURVEY FORM RAW DATA (Summer Survey) - Continued

Case #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	49A	50	51	52	53	54	55
											← OCCUPANCY →											SUITE				SHEA					AIR				CLOTHES		OPEN WINDOWS		→ APT SUITE →				→ BUILDING →						→ SOUR →					
BUILDING								INTERVIEWER									LEVEL OF																																													
ISOLATED																																																										
DIVERTED																																																										
NEGOTIATED																																																										
QUOTED																																																										
#	RECORD	YMMDD	HHMM	YES	#	#	#	?	C	%	S	S	S	S	S	N	S	E	#	SA	S	N	T	T	K	S	R	G	N	T	S	R	A	Y	N	D	R	R	M	E	N	E	N	G	M	E	E	N	E	N	G	E	R	N	M	S
4	1	880816	900	1	166	5	4	1	25	48	2	1	1	2	0	0	2	4	0	0	1	5	0	0	10	6	0	0	0	0	1	0	0	0	0	0	1	1	1	0	1	5	8	2	0	0	0	0	0	0	0	3	0	0	0	2
4	1	880816	945	1	166	6	7	1	26	44	1	0	1	1	0	0	0	0	0	0	1	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1
4	1	880816	956	1	166	7	7	1	25	45	1	0	1	1	0	0	0	0	1	1	4	0	0	14	2	0	0	1	0	1	0	0	1	0	0	0	0	1	0	0	2	3	1	0	0	0	0	0	0	0	0	1	0	0	1
5	1	880817	921	1	96	1	4	1	25	42	2	1	0	0	1	1	1	2	0	0	1		0	0	14	30	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1
5	1	880817	932	1	96	3	15	0	26	36	2	1	1	0	2	0	0	0	0	0	2		0	0	14	14	0	0	0	0	1	0	0	0	0	1	1	0	1	1	2	3	6	1	0	0	0	0	0	1	0	1	2	12	6	1	2	0	0	0	1
5	1	880817	941	1	96	5	4	1	25	40	2	1	1	0	1	1	2	2	0	1	2		1	0	7	14	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	5	11	1	1	0	0	0	0
5	1	880817	951	1	96	6	6	1	26	38	1	0	1	1	0	0	1	1	0	0	1		0	0	10	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2		8	2	2	0	1	0	0
5	1	880817	1015	1	96	7	11	0	25	39	1	0	1	1	0	0	0	0	0	0	1		0	0	10	2	0	0	0	0	0	0	0	1	0	0	1	1	0	0	6	0	0	0	1	0	1	1	4	11	0	0	0	0	0	0
5	1	880817	1007	1	96	9	2	0	27	35	1	0	1	0	1	0	0	0	0	1	1		0	0	7	7	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1		11	3	0	0	0	0	2
5	1	880817	1025	1	96	11	5	1	24	41	3	0	3	0	1	2	0	0	0	1	2		0	0	19	21	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	2	5	10	2	1	1	1	1	3	10	3	1	0	0	1	0
5	1	880817	1053	1	96	12	10	0	25	36	2	1	1	2	0	0	0	0	0	0	1		0	0	7	14	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5	1	880817	1106	1	96	14	6	0	24	38	1	0	1	1	0	0	0	0	0	0	1		0	0	14	14	0	0	0	0	1	0	0	1	0	0	1	1	0	1	1	3	5	5	1	0	0	0	0	0	0	0	2	0	1	0
5	1	880817	1110	1	96	16	10	1	24	38	2	1	1	2	0	0	1	2	0	1	1		0	0	14	14	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	5	11	2	1	1	1	1	5	11	3	3	0	0	0	0
5	1	880817	1143	1	96	18	1	0	28	38	1	0	1	1	0	0	0	0	2	0	1		0	0	7	7	1	0	1	0	1	0	0	1	0	0	1	1	1	1	1	3	5	5	1	0	0	0	0	0	0	0	2	0	1	0
5	1	880817	1202	1	96	19	17	0	27	32	2	0	2	0	1	1	0	0	0	0	1		0	0	10	14	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	3	3	5	1	0	0	0	0	0	0	0	0	0	0	0	2
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5	1	880817	1920	1	96	22	3	1	27	31	3	1	2	0	3	0	1	3	0	0	2		0		10	3	0	0	0	0	1	0	0	0	0	0	1	1	0	1	1	3	5	5	2	1	1	9	4		6	1	0	2	0	0	3
6	3	880822	1408	2	9	1	8	0	25	33	2	1	1	0	2	0	0	0	5	0	2	1	0	1	7	13	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	2	5	6	2	0	2	0	0	1
6	3	880822	1350	2	9	1	2	0	27	33	2	1	1	0	1	1	1	2	0	0	2	3	0	1	8	25			0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	2	5	9	2	0	0	0	0	1
6	3	880822	1434	2	9	2	4	0	26	33	2	1	1	0	1	1	0	0	0	0	2	5	0	1	21	12	0	0	0	1	1	0	0	0	0	0	1	0	1	0	3	5	5	1	0	0	0	0	0	0	0	1	0	0	0
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6	3	880822	1501	2	9	3	9	0	25	31	3	2	1	0	3	0	0	2	2	2	0	2	1	0	1	28	21	0	0	1	1	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	5	9	1	2	0	0	0	1
6	3	880822	1448	2	9	3	5	0	26	33	3	2	1	0	2	1	1	3	3	0	2	1	0	1	14	17	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	2	5	11	2	0	1	0	0	3
7	3	880821	1000	2	18	2	3	1	24	55	2	1	1	0	1	1	0	0	2	1	2	8	0	0	7	11	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	7	11	3	1	1	1	4	5	11	1	0	3	0	0	1
7	3	880821	1040	2	18	3	12	1	22	51	3	2	1	0	2	1	2	3	1	1	2	4	0	1	8	14	0	1	0		0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	7	4	5	8	1	1	1	0	0	3
7	3	880821	1130	2	18	5	2	1	25	51	2	1	1	0	2	0	2	4	0	1	2	8	0	1	10	14	0	0	1		1	0	0	0	0	0	1	1	1	1	1	4	4	1	0	1	1	1	4	5	9	1	0	3	0	0	1
7	3	880821	1300	2	18	6	10	0	25.9	51.7	2	1	1	0	1	1	0	0	0	0	2	4	0	1	16	14	0	0	0	1	1	0	0	0	0	0	1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7	3	880821	1315	2	18	8	13	0	26	52	3	2	1	0	2	1	0	0	0	0	2	8	0	1	7	21	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7	3	880821	1325	2	18	9	11	1	26	51	2	0	2	0	1	1	1	1	2	0	2	4	0	1	7	12	0	1	0	0	1	0	0	0	0	1	0	1	0	1	1	1	4	1	1	0	0	0	0	0	0	0	3	0	0	2
7	3	880821	1335	2	18	11	7	1	26	52	3	1	2	0	1	2	0	0	0	0	2	5	0	1	7	21	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	4		9	1	1	3	0	0	0
7	3	880821	1350	2	18	12	11	0	27	52	2	1	1	0	1	1	0	0	0	0	2	5	0		19	30	1	0	0	1	1	0	0	0	0	1	1	0	1	1	3	5	5	0	0	0	0	0	0	0	0	3	0	0	0
7	3	880821	1425	2	18	14	5	1	26	50	2	1	1	0	1	1	1	3	2	1	2	4	0	1	14	14	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	2	1	3	1	1	1	1	5	1	3	3	3	1	2	3
7	3	880821	1900	2	18	15	12	0	28	47	2	1	1	0	1	1	1	1	2	0	2	4	0	1	21	21	0	0	0	0		0	0	1	0	1	0	1	1	1	1	1	3	5	5	3	1	1	5	3	5	5	3	0	0	3	0	0	2
8	3	880822	913	2	90	1	3	1	21	57	1	1	0	1	0	0	1	1	0	0	1	2	1	1	14	7	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	3	880822	940	2	90	2	16	1	25	36	1	0	1	1	0	0	1	1	0	0	1	7	1	1	4	3	0	0	0		0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	2		1	2	0	0	0	0	0
8	3	880822	956	2	90	4	11	1	25	38	1	0	1	1	0	0	1	1	0	0	1	3	1	1	14	7	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	2	11	11	2	0	0	0	0	0
8	3	880822	1008	2	90	5	6	1	26	36	1	0	1	1	0	0	1	1	0	0	1	3	1	1	21	7	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APARTMENT SUITE SURVEY FORM RAW DATA (Summer Survey) - Continued

On #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	49A	50	51	52	53	54	55
											←			OCCUPANCY			→					S									A					C		←	→	←			→	S	←					→	S			←	→	
								I										L				U			S		E	A		I					L		OPEN		APT SUITE				U	BUILDING						U		OD-		
								N										E				I		B	H		X	I	C	R					O		WIN-						M						M		OURS		
								T			ø							V				T	K	A	O		T	R	L						T	R	DOWS	I			D	M	I				D	M				C
B								E								ø		E			ø	E	I	T	M	W	H	R		E	F				H	E			A	B		E	E	A	B			E	E		S		L
U								R			O		ø	ø			ø	L		A			T	H	E	E	U	A	C	A	R				E	D			Q	O		S	R	Q	O			S	R		T		E
I	S							V			C				ø	C				L	B	L			A	R	M		O	N	E			H	S	E				T		C		T			C		M	A		B	A
L	U					F	S	I			C	ø	F	S		H	S	OF		L	E	O	E	E	L	S	I	H	N	I	S			A		C			P	H		R	R	P	H			R	R	O	T	K	A	N
D	R	D	T			L	U	E	T		U		E	E	A	I	M		P	E	A	D	C	X	X	S	/	D	E	D	N	H	W		N	S	O	S	W	R	E			I	A	R	E			I	A	I	I	I	T	L
I	V	A	I		O	O	I	W	E		P	M	M	N	D	L	O	S	E	R	S	R	A	H	H	/	B	I	A	I	G	E	A	D	G	O	R	U	I	O	R			P	N	O	R	W		P	N	S	C	T	H	I
N	E	T	M	C	H	O	T	E	M	R	A	A	A	A	I	U	D	K	M	T	G	T	O	T	A	A	W	A	F	T	T		N	S	R		F	A	M	N	B	S	W	T	T	K	B	S	H	W	T	T	K	T		C	R	N
G	Y	E	E	I	C	R	E	D	P	H	N	L	L	O	L	R	E	O	S	I	H	O	I	U	U	E	T	I	I	I	M	E	H	Y	D	T	T	M	T	L	O	H	I	I	I	L	O	E	H	I	I	I	U	A	H	O	E
	O			T							T	E	E	R	T	E	R	K		E	M	M	O	S	S	E	H	E	N	O	A	R	E	E	R	E	E	E	E	M	E	M	O	N	E	M	R	E	M	O	N	R	I	E	O	S
ø	R	YMMD	HHMM	Y	ø	ø	ø	?	C	%	S	S	S	S	S	N	S	E	ø	SA	S	N	T	T	K	S	R	G	N	T	S	R	R	Y	N	D	R	R	M	E	N	E	N	G	M	E	E	N	E	N	G	E	R	N	M	S
8	3	880822	1018	2	50	7	1	1	24	38	1	0	1	1	0	0	0	0	0	0	1	7	1	1	19	3	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	3	5	5	3	0	0	0	0	0	0	0	3	0	0	0
8	3	880822	1030	2	50	8	12	0	23	30	1	0	1	1	0	0	0	0	0	0	1	8	1	1	14	7	0	0	1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8	3	880822	1040	2	50	10	16	1	25	38	1	1	0	1	0	0	1	1	0	0	1	7	1	1	7	7	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	1	2		11	3	0	0	0	0	1
8	3	880822	1100	2	50	11	4	1	25	37	1	0	1	1	0	0	0	0	0	0	1	8	1	1	7	7	0	1	0	0	1	0	0	1	1	0	1	1	1	1	1	1	7	3	1	0	0	0	0	0	0	0	1	0	2	0
8	3	880822	1135	2	50	14	3	0	25	34	1	0	1	1	0	0	0	0	0	0	0	1	2	1	1	7	7	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	3	880822	1145	2	50	15	8	1	25	38	1	0	1	1	0	0	0	0	0	1	1	3	1	1	7	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2		11	1	0	0	0	0	0
9	1	880824	910	3	3	1	1	1	28	40	1	1	0	1	0	0	0	0	0	0	0		0	0	8	3	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	4	1	0	2	0	0	0	1
9	1	880824	917	3	3	1	17	1	26	42	1	1	0	1	0	0	0	0	0	1	0		0	0	5	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
9	1	880824	925	3	3	2	12	1	25	42	1	0	1	1	0	0	0	2	0	0	1		0	0	14	4	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	5	5	1	3	3	0	0	1
9	1	880824	932	3	3	3	6	1	24	44	1	0	1	1	0	0	1	3	0	0	1		0	0	7	7	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	3	3	1	2	2	0	0	1
9	1	880824	945	3	3	4	4	0	24	42	1	1	0	1	0	0	0	2	0	0	1		0	0	14	7	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	1	2	1	1	0	0	0	0	2
9	1	880824	1000	3	3	5	8	1	25	44	1	1	0	0	1	0	0	0	3	0	1		0	0	5	4	0	0	0	0	1	0	0	0	0	0	1	0	1	1	1	5	11	1	1	1	1	1	3	5	11	2	3	0	0	1	1
9	1	880824	1015	3	3	6	11	1	25	39	1	1	0	1	0	0	1	1	0		0		0	0			0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
9	1	880824	1030	3	3	8	11	0	27	39	1	1	0	0	0	0	0	0	0	0	0		0	0	14	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	2	2	0	2	0	0	0	0	0	0	1	0	0	0	1
9	1	880824	1035	3	3	7	16	1	26	40	1	1	0	1	0	0	1	3	0	0	0		0	1	14	14	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
9	1	880824	1055	3	3	8	3	0	23	37	1	0	1	1	0	0	1	2	3	0	0		0	0	12	3	1	0	1	0	1				1	0	0	0	1	0	0	0	0	0	0	1	0	1	1	5	10	0	1	1	0	0	1
10	1	880824	1256	3	1	1	13	1	28	40	1	0	1	1	0	0	0	0	0	0	1		0	1	14	3	1	0	0	0	1	0	0	1	0	1	1	1	1	1	1	1	5	1	2	1	1	1	1	5	11	3	3	0	0	2	1
10	1	880824	1306	3	1	1	6	1	27	38	1	1	0	0	1	0	0	0	2	0	1		0	0	10	4	0	1	0	0	1	0	0	0	0	0	1	0	1	1	1	1	1	11	2	1	1		1	1	1	1	3	0	0	0	1
10	1	880824	1315	3	1	2	3	0	26	35	1	0	1	1	0	0	0	0	2	1	1		0	1	14	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	880824		3	1	3	7	1	24	40	2	1	1	0	2	0	2	4	0	1	1		0	1	14	14	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	3	3	5	3	1	0	1	1	4	1	2	3	3	0	0	1
10	1	880824	1340	3	1	4	2	1	26	39	2	1	1	0	2	0	1	1	0	1	1		0	0	7	8	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	4		1	0	0	0	0	0	0
10	1	880824	1357	3	1	4	16	1	27	37	3	1	2	0	1	2	1	1	0	1	2		0	0	20	21	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	2	5	9	3	1	0	1	1		9	2	3	0	0	0	2
10	1	880824	1413	3	1	5	17	0	24	38	2	0	2	0	1	1	1	3	0	0	2		0	0	21	28	0	0	1	0	1	0	0	0	1	0	1	1	0	1	1	1	5	7	1	0	0	0	0	0	0	0	0	0	0	0	2
10	1	880824	1420	3	1	5	9	1			3	0	3	1	1	1	0	0	0	1	1				21	21	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	1
10	1	880824	1428	3	1	6	21	1	25	39	2	1	1	0	1	1	0	0	0	1	2		0	0	14	14	1	0	1	0	0	0	0	0	0	0	1	0	1	1	1	1	5	7	2	1	1	1	1	1	11	3	0	2	0	0	2
10	1	880824	1446	3	1	6	21	0	24	39	1	1	0	0	1	0	1	2	0	0	1		0	1	2	4	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2
11	2	880830	1323	4	15	3	7	1	23	47	2	0	2	0	1	1	0	0	0	1	2	1	0	0	18	18	0	0	0	0	0	0	0	0	0	1	1	0	1	1	4	5	11	1	1	0	3	4	5	9	1	2	0	1	0	
11	2	880830	1215	4	15	4	2	0	22	51	3	2	1	0	2	1	0	0	0	0	2	5	0	1	19	12	1	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1
11	2	880830	1300	4	15	5	12	0	22	50	4	2	2	0	2	2	1	1	0	1	2	1	0	0	20	17	1	0	0	1	0	0	0	0	0	1	1	1	1	0	3	4	1	1	0	0	0	0	0	0	1	0	0	0	0	3
11	2	880830	1345	4	15	6	1	0	22	47	3	2	1	0	2	1	0	0	0	0	2	5	0	1	15	15	0	0	0	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	0	2	4	5	8	1	1	0	0	0	2
11	2	880830	1221	4	15	7	5	0	22	51	2	0	2	0	1	1	1	1	0	0	2	5	0	1	17	12	1	0	0	1	0	0	0	1	0	0	1	1	1	0	4	3	1	1	0	0	0	0	0	0	0	1	0	0	0	1
11	2	880830	1203	4	15	8	7	0	23	49	2	0	2	0	1	1	1	2	0	2	1	0	1	18	12	0	0	0	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	2	2	5	11	8	0	1	1	0	0	1
11	2	880830	1154	4	15	9	10	1	30	44	3	2	1	0	2	1	2	1	0	1	2	1	0	0	21	21	1	0	0	1	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2
11	2	880830	1117	4	15	10	14	1	21	47	2	1	1	0	1	1	0	0	0	0	2	4	0	0	7	8	0	0	0	1	1	0	1	1	0	0	1	0	1	0	1	6	4	7	1	0	0	0	0	0	0	0	1	0	1	1
11	2	880830	1130	4	15	11	7	1	24	41	3	0	3	0	1	2	1	1	0	0	2	8	0	0	21	21	1	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	7	1	5	3	0	1	3	0	0	3
11	2	880830	1142	4	15	12	8	0	22	47	3	1	2	0	2	1	1	1	0	0	2	1	0	0	15	18	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
12	2	880830	1636	4	16	2	7	1	24	31	1	0	1	1	0	0	0	0	0	0	1	1	1	0	7	5	0	0	0	0	0	0	0	1	0	1	1	0	1	1	2	5	3	1	0	0	0	0	0	0	1	0	0	0	0	0

APARTMENT SUITE SURVEY FORM RAW DATA (Summer Survey) - Continued

On #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	49A	50	51	52	53	54	55
											←			OCCUPANCY			→																																											
								I										L				U			S		E	A		A					C		OPEN			APT SUITE			S		BUILDING						U			OD-		
								N										E				I		B		H		X	I	C	I				L		WIN-						U						M			OURS		
								T			#							V				T	K	A		O		T	R	L					O		DOWS	I					M						M					
B								E								#		E			#	E	I	T	M	W	H	R		E	F				T	R			D	M	I				D	M						C
U								R			O		#	#			#	L		A			T	H	E	E	U	A	C	A	R				E	D			A	B					E	E	A	B			S			L
I	S							V			C			#	C					L	B	L			A	R	M		O	N	E			H	S	E			Q	O					S	R	Q	O			T			E
L	U					F	S	I			C	#	F	S		H	S	OF		L	E	O	E	E	L	S	I	H	N	I	S			A		C				T						C			T			C		M	A		B	A
D	R	D	T			L	U	E	T		U		E	E	A	I	M		P	EA	D	C	X	X	S	/	D	E	D	N	H	W		N	S	O	S	W	R	E						R	R	P	H			R	R	O	T	K	A	N
I	V	A	I		O	O	I	W	E		P	M	M	M	N	D	L	O	S	E	RS	R	A	H	H	/	B	I	A	I	G	E	A	D	G	O	R	U	I	O	R						I	A	R	E			I	A	I	I	I	T	L
N	E	T	M	C	H	O	T	E	M	R	A	A	A	A	I	U	D	K	M	T	GT	O	T	A	A	W	A	F	T	T		N	S	R		F	A	M	N	B	S	W	T	T	K	B	S	H	W	T	T	K	T		C	R	N
G	Y	E	E	I	C	R	E	D	P	H	N	L	L	O	L	R	E	O	S	IH	O	I	U	U	E	T	I	I	I	M	E	H	Y	D	T	T	M	T	L	O	H	I	I	I	L	O	E	H	I	I	I	U	A	H	O	E
	O			T							T	E	E	R	T	E	R	K		EM	M	O	S	S	E	H	E	N	O	A	R	E	E	R	E	E	E	E	E	M	E	M	O	N	E	M	R	E	M	O	N	R	I	E	O	S
#	R	YMMD	HHMM	Y	#	#	#	?	C	%	S	S	S	S	S	S	N	S	E	#	SA	S	N	T	T	K	S	R	G	N	T	S	R	R	Y	N	D	R	R	M	E	N	E	N	G	M	E	E	N	E	N	G	E	R	N	M	S
12	2	880830	1423	4	16	5	9	1	23	31	1	0	1	1	0	0	0	0	0	0	1	1	1	0	18	7	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12	2	880830	1810	4	16	6	5	0	23	37	1	0	1	1	0	0	0	0	0	0	1	6	0	0	18	7	0	0	0	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
12	2	880830	1800	4	16	7	1	1	22	37	1	0	1	1	0	0	0	0	0	0	1	0	1	0	14	7	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12	2	880830	1553	4	16	8	8	1	25	33	1	0	1	1	0	0	1	2	0	1	1	1	0	0	14	7	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12	2	880830	1543	4	16	9	9	0	24	38	1	0	1	1	0	0	1	1	0	0	1	1	0	0	19	7	0	1	0	1	0	0	0	1	0	0	1	1	1	0	4	5	4	0	0	0	0	0	0	0	1	0	0	0	2
12	2	880830	1523	4	16	10	1	0	23	39	1	1	0	1	0	0	0	0	0	0	1	5	1	0	18	7	0	0	0	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1
12	2	880830	1507	4	16	11	7	1	23	39	1	0	1	1	0	0	1	1	0	0	1	8	0	0	21	7	1	0	0	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1
13	2	880831	1053	5	1	1	A	0	22	45	2	1	1	0	1	1	0	0	0	0	2	1	0	0	15	14	0	0	0	0	0	0	0	1	0	0	1	0	1	0	4	5	2	0	0	0	0	0	0	0	1	0	0	0	2
13	2	880831	1125	5	1	1	B	1	21	43	2	0	2	0	1	1	1	2	0	1	2	3	0	1	20	14	0	0	0	0	1	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
13	2	880831	1137	5	1	1	A	0	23	45	2	0	2	0	1	1	0	0	0	0	2	3	0	1	17	10	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	0	4	1	5	8	1	1	0	0	0	2
13	2	880831	1033	5	1	1	A	1	22	45	3	1	2	0	2	1	1	1	0	0	2	3	0	0	20	18	0	0	0	1	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
13	2	880831	1153	5	1	2	D	0	23	41	2	1	1	0	1	1	0	0	0	0	2	3	0	0	21	14	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
13	2	880831	1017	5	1	2	C	1	23	43	2	0	2	0	1	1	0	0	0	0	2	7	0	0	7	14	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
14	2	880831	1452	5	3	1	8	1	24	42	3	2	1	0	2	1	0	0	0	0	2	7	0	0	21	15	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	10	1	5	8	1	2	0	2	0	1
14	2	880831	1347	5	3	1	1	1	18	58	5	2	3	0	2	3	1	1	2	0	2	3	0	0	10	42	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	3
14	2	880831	1530	5	3	2	9	0	24	43	2	0	2	0	0	2	2	2	0	1	2	7	1	1	7	14	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
14	2	880831	1517	5	3	2	7	0	21	45	2	0	2	0	1	1	1	2	0	1			0	0	21	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
14	2	880831	1438	5	3	3	1	1	24	42	3	1	2	0	2	1	2	2	0	0	2	3	1	0	14	21	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
14	2	880831	1439	5	3	3	10	0	23	44	4	2	2	0	2	2	1	1	0	1	2	7	0	1	10	15	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
15																																																								
15	2	880901	1012	5	4	2	2	1	22	40	1	0	1	1	0	0	0	0	0	0	1	5	1	1	10	7	0	0	0	0	1	0	0	1	0	0	1	1	1	0	2	7	4	1	0	0	0	0	0	0	0	0	0	0	1
15	2	880901	1027	5	4	3	7	0	22	41	1	1	0	1	0	0	0	0	0	1	1	1	0	0	15	7	0	0	0	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
15	2	880901	957	5	4	4	7	1	22	41	1	0	1	1	0	0	1	2	0	0	2	1	1	1	7	7	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	2	880901	953	5	4	6	8	1	23	42	1	0	1	1	0	0	0	0	0	0	1	1	0	0	7	7	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	2	880901	932	5	4	8	1	1	21	44	1	0	1	1	0	0	0	0	0	0	1			0	0	20	7	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	0	4	5	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0

IAQ TEST RAW DATA (Winter Survey)

On #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
										AIR					
BUILDING					LOCATION					MOVE	←				→
	DATE	TIME											ppm		
#	yymmdd	hhmm	CITY	OHIO	#	#	C	%	NOT	CO 2	CO 2	CHO	NO 2	NH 3
1	890210	1056	1	T078	4	10	0	18.	21	1	0	800	0	0	0
1	890210	1022	1	T078	2	2	0	17.	17	1	0	550	0	0	0
1	890210	1122	1	T078	2	-1	0	17.	43	0	0	550	0	0	0
2	890222	1455	1	T084	3	8	0	25.	18	0	0	600	0	0	0
2	890222	1310	1	T084	0	14	13	24.	20	0	8	700	0	0	0
2	890222	1310	1	T084	0	17	10	24.	24	0	1	1000	0	0	0
3	890227	1515	1	T088	4	15	0	27.	15	0	0	600	0	0	0
3	890227	1345	1	T088	0	4	9	22.	46	0	0	700	0	0	0
3	890227	1458	1	T088	3	9	0	25.	16	0	0	600	0	0	0
3	890227	1440	1	T088	2	3	0	23.	20	0	0	600	0	0	1
4	890221	1217	1	T168	3	3	0	24.	28	0	2	800	0	0	0
4	890221	1115	1	T168	4	5	4	24.	34	0	4	1150	0	0	0
5	890228	1500	1	T098	4	21	0	24	14	0	1	500	0	0	0
5	890228	1545	1	T098	2	3	0	26.	13	0	1	800	0	0	0
5	890228	1530	1	T098	3	12	0	25.	13	0	1	700	0	0	0
5	890228	1340	1	To	0	18	10	23	14	0	5	600	0	0	0
5	890228	1200	1	T098	0	11	5	26	23	0	3	800	0	0	0
6	890308	1220	2	O09	4	3	0	24.	19	0	3	800	0	0	0
6	890308	1240	2	O09	2	1	0	23	19	0	1	700	0	0	0
6	890308	1110	2	O09	0	2	9	24.	24	0	5	1100	0	0	0
7	890310	1415	2	O18	4	12	0	23	19	0	8	700	0	0	0
7	890310	1056	2	O18	0	5	2	22	19	0	3	700	0	0	0
7	890310	1350	2	O18	2	4	0	21	23	0	0	800	0	0	0
7	890310	1243	2	O18	0	14	5	25.	14	0	0	800	0	0	0
8	890309	1226	2	O60	2	3	0	22	19	0	3	700	0	0	0
8	890309	1124	2	O60	0	11	4	24.	11	0	2	700	0	0	0
8	890309	1320	2	O60	4	12	0	21	15	0	1	600	0	0	0
9	890223	1130	3	W3	0	4	1	23	16	0	0	800	0	0	0
9	890223	1505	3	W3	3	8	0	21	15	1	0	700	0	0	0
9	890223	1440	3	W3	2	2	0	22	15	0	0	700	0	0	0
10	890224	1010	3	W1	0	4	2	22	26	0	1	800	0	0	0
10	890224	1357	3	W1	2	2	0	20	22	0	0	800	0	0	0
10	890224	1440	3	W1	4	5	0	22	19	0	1	700	0	0	0
10	890224	1215	3	W1	0	3	7	24.	26	0	5	1300	0	0	1
11	890213	1600	4	S16	4	10	14	19.	23.	0	0	900	0	0	0
11	890213	1120	4	S15	3	8	0	20.	20	0	0	500	0	0	0
11	890213	1050	4	S15	2	0	0	17.	29	1	0	500	0	0	0
11	890213	1140	4	S15	4	12	8	21	18	0	0	600	0	0	0
11	890213	1610	4	S15	2	0	bm	13.	51	1	80	500	0	0	0
12	890214	1008	4	S16	4	11	0	22	22	0	5	500	0	0	0
12	890214	947	4	S16	3	4	0	21	23	0	0	500	0	0	0
12	890214	1042	4	S16	2	0	bm	17.	37	0	60	500	0	0	0
12	890214	908	4	S16	2	1	0	20	29	0	5	500	0	0	0
13	890216	1001	5	Th1	2	1	0	17.	24	0	0	500	0	0	0
13	890216	1300	5	Th1	3	2	0	19.	14	0	0	800	0	0	0
13	890216	1029	5	Th1	3	2	0	18.	22	0	0	1000	0	0	0
14	890215	1740	5	Th3	4	3	8	20.	32	0	0	300	0	0	0
14	890215	1407	5	Th3	4	3	0	19.	15	0	0	900	0	0	0
14	890215	1.44	5	Th3	2	1	0	18.	15	0	0	500	0	0	0
15	890219	954	5	Th4	4	5	0	18.	14	0	0	800	0	0	0
15	890219	908	5	Th4	2	1	0	21	13	0	0	800	0	0	0

IAQ TEST RAW DATA (Summer Survey)

On	1	2	3	4	5			6	7	8	9	10	11	12	13	14
										AIR						
BUILDING					LOCATION					MOVE	←					→
	DATE	TIME											ppm			
#	yymmdd	hhmm	CITY	OHIO	#	#	C	%	NOT	CO 2	CO 2	CHO	NO 2	NH 3	NOZE
1	880818	1408	1	T078	2			28	33	0	0	800	0	0	0	
1	880816	1250	1	T078	0	4	19	27	32	1	0	800	0	0	0	
1	880816	1433	1	T078	4			26	33	0	0	800	0	0	0	
2	880829	1110	1	T084	4	14		27	44	0	0	800	0	0	0	
2	880829	1126	1	T084	2	8		27	44	0	0	550	0	0	0	
2	880829	1041	1	T084	0	15	7	27	47	0	0	900	0	0	0	0
3	880828	1220	1	T098	2	3		24	47	0	0	900	0	0	0	
3	880828	1230	1	T098	3	9		25	45	0	0	550	0	0	0	
3	880828		1	T098	0	4	8	25	43	0	1	500	0	0	0	
3	880829	1245	1	T098	4	15		26	47	0	0	550	0	0	0	
4	880816	1007	1	T168	3			25	44	0	0	800	0	0	0	
4	880816	900	1	T168	0	5	4	25	48	1	0	550	0	0	0	0
5	880817	835	1	T098	2	3		25	41	0	0	800	0	0	0	
5	880817	905	1	T098	4	21		26	39	0	0	800	0	0	0	
5	880817	950	1	T098	3	12		26	38	0	0	800	0	0	0	
5	880817	1121	1	T098	9	18	10	24	38	0	0	800	0	0	0	
5	880817	1035	1	T098	0	11	5	24	41	0	0	550	0	0	0	
6	880822	1416	2	O09	2	1		26	32	0	0	800	0	0	0	
6	880822	1500	2	O09	2	3		26	33	1	0	800	0	0	0	
6	880822	1533	2	O09	0	3	5	25	31	1	0	800	0	0	0	
7	880821	1004	2	O18	0	2	3	24	55	1	0	1000	0	0	0	
7	880821	1435	2	O18	0	14	5	26	50	0	0	800	0	0	2.5	
7	880821	1406	2	O18	4	12		26	50	2	0	800	0	0	0	
7	880821	1100	2	O18	2	4		26	51	0	0	800	0	0	0	
7	880821	1200	2	O18	0	5	2	26	51	1	0	800	0	0	0	
8	880822	1200	2	O60	4	12		26	33	0	0	800	0	0	0	
8	880822	1110	2	O60	0	11	4	25	37	1	0	800	0	0	0	
8	880822	926	2	O60	2	3		24	38	1	0	800	0	0	0	
9	880824	960	3	W3	3	4	4	24	42	0	0	800	0	0	0	
9	880824	1116	3	W3	2	2		22	47	1	0	450	0	0	0	0.08
9	880824	1100	3	W3	4	8		23	44	1	0	400	0	0	0	
10	880824	1329	3	W1	0	3	7	24	40	1	0	900	0	0	0	
10	880824	1450	3	W1	4	5		27	33	0	0	800	0	0	0	
10	880824	1502	3	W1	2	2	20	26	33	0	0	500	0	0	0	
10	880824	1360	3	W1	0	4	2	26	39	0	0	900	0	0	0	
11	880830	1053	4	S15	2	1		21	49	1	0	800	0	0	0	
11	880830	1057	4	S16	3	8		24	41	0	0	500	0	0	0	
11	880830	1107	4	S16	0	10	14	24	43	1	0	800	0	0	0	
11	880830	1021	4	S15	A	-1		21	52	1	5	1000		0	0	
11	880830	1048	4	S15	4	12		23	45	0	0	600	0	0	0	
12	880830	1441	4	S16	4	11		24	34	1	0	900	0		0	
12	880830	1400	4	S16	2			25	35	1	0	500	0	0	0	
12	880830	1344	4	S16	2			23	36	1	20	500	0	0	0	
12	880830	1429	4	S16	3	9		24	36	0	0	500	0	0	0	
13	880831	950	5	Th1	2	1		21	44		0	800	0	0	0	
13	880831	1002	5	Th1	4	2		23	41	0	0	900	0	0	0	
13	880831	1047	5	Th1	4	2		22	43		0	900	0	0	0	
14	880831	1400	5	Th3	2	1		22	47	1	0	900	0	0	0	
14	880831	1411	5	Th3	4	3		22	44	1	0	900	0	0	0	
14	880831	1318	5	Th3	0	1	1	22	44	1	0	800	0	0	0	
15	880901	859	5	Th4	4	5		20	43	1	0	800	0	0	0	
15	880901	845	5	Th4	2			19	48	1	0	300	0	0	0	0